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AMENDMENT #1

to the

RECORD OF DECISION

for the

J. H. BAXTER SUPERFUND SITE

WEED, CALIFORNIA

U. S. Environmental Protection Agency
Region 9
San Francisco, California

March 27, 1998

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ACRONYMS

ARAR - Applicable or Relevant and Appropriate Requirement
ATSDR - Agency for Toxic Substances and Disease Registry
bgs - below ground surface
C&TS - Characterization and Treatability Study
CAMU - Corrective Action Management Unit
CCR - California Code of Regulations
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
COC - Contaminants of Concern
DHS - California Department of Health Services
DNAPL - Dense Non-Aqueous Phase Liquids
DTSC - California Environmental Protection Agency Department of Toxic Substances Control
EPA - U.S. Environmental Protection Agency
EPCM - Engineering, Procurement and Construction Management
FFS - Focused Feasibility Study and Evaluation of Technical Impracticability
FS - Feasibility Study
GWRDI - Ground Water Remedial Design Investigation
IP - International Paper Company
LDR - Land Disposal Restriction
MCL - Maximum Contaminant Level
NCP - National Oil and Hazardous Substances Pollution Contingency Plan
NCRWQCB - North Coast Regional Water Quality Control Board
ND - below detection limit (not detected)
NPDES - National Pollutant Discharge Elimination System
NPL - National Priorities List
O&M - operating and maintenance
OCA - Older Clastic Assemblage
PAH - polycyclic aromatic hydrocarbon
PCP - pentachlorophenol
ppb - part(s) per million
PPE - personal protective equipment
ppm - part(s) per million
PRG - preliminary remediation goal
PRP - Potentially Responsible Party
PSA - Pre-Shastina Alluvial Assemblage
QA/QC - quality assurance/quality control
RAO - Remedial Action Objectives
RCRA - Resource Conservation and Recovery Act
RD - Remedial Design
RDR - Remedial Design Report
RD/RA - Remedial Design/Remedial Action
RI - Remedial Investigation
RI/FS - Remedial Investigation/Feasibility Study
ROD - Record of Decision
RWQCB - Regional Water Quality Control Board
SARA - Superfund Amendments and Reauthorization Act
SOW - Scope of Work
STLC - soluble threshold limit concentrations
TBC - To Be Considered
TCLP - Toxicity Characteristic Leachate Procedure
TI - Technical Impracticability
TTLC - total threshold limit concentration
UAO - Unilateral Administrative Order
WDR - Waste Discharge Requirement
WET - Waste Extraction Test
WRG - Weed Remediation Group
YCA - Younger Clastic Assemblage

1. DECLARATION

SITE NAME AND LOCATION

J.H. Baxter Superfund Site
Weed, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the U.S. Environmental Protection Agency's (EPA) revised selected remedial actions for certain contaminated soils and groundwater at the J.H. Baxter Superfund Site in Weed, California, which were chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site.

The State of California concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in the Record of Decision (ROD), as modified by this ROD Amendment, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This ROD Amendment modifies the previously selected remedy for contaminated groundwater and soils at the J.H. Baxter Superfund Site.

Studies undertaken under EPA's direction to design the remedies selected in the 1990 ROD resulted in a significant increase in the understanding and in the estimated volume of Dense Non-Aqueous Phase Liquids (DNAPLs) in soil at the Site. These increases, together with questions concerning the potential effectiveness of the chosen remedy for the DNAPL-impacted area, caused EPA to undertake the Final Focused Feasibility Study and Evaluation of Technical Impracticability (FFS) (Bechtel 1997). On the basis of the FFS analysis, EPA concluded that it is not possible to achieve the 1990 ROD cleanup standards for groundwater within the DNAPL zone. For this reason, this area of the Site is also referred to as the Technical Impracticability (TI) zone for groundwater cleanup. This ROD Amendment documents a waiver of the ground water cleanup standards set forth in the 1990 ROD, based on the conclusion that it is technically impracticable from an engineering perspective (TI), to achieve these ground water cleanup standards for the DNAPL zone. The factual basis for proposing a TI waiver of the ground water cleanup standards is set forth in the TI Evaluation Summary in the FFS.

The remedy consists of the 1990 ROD components plus enhancements, modifications, and additional containment measures as described in this amendment. Actions have also been selected to modify other aspects of the soils remedy previously selected for the site in the 1990 ROD. The major components of the selected remedy include the following:

Slurry Wall

- Enhancement of the groundwater remedy described in the 1990 ROD by constructing a slurry wall around the DNAPL zone. The slurry wall is a physical barrier that would prevent further contamination and facilitate faster cleanup of the groundwater outside of the DNAPL zone. The slurry wall was added as a remedial design element to enhance the restoration of groundwater outside of the DNAPL zone. The remedy, without a slurry wall, will not be protective of human health and the environment. Groundwater outside of the DNAPL zone will be restored by pumping and treatment as provided for by the 1990 ROD.

- Cleanup of contaminated surface soils, whether inside or outside of the DNAPL zone, and contaminated subsurface soils (deeper than two feet) outside of the NAPL zone in accordance with the ROD, with certain modifications. Subsurface soils within the DNAPL zone will not be excavated.

Additional Containment and Institutional Controls within the DNAPL Zone

- Regrading and covering of the open excavation on the Roseburg property (Roseburg excavation) which acts as a collection point for contaminated surface runoff. The excavation would be covered with a minimum of two feet of clean soil. These measures would improve surface drainage, reduce contamination of surface water runoff, and reduce the potential for worker exposure to contaminated soils.

- Collection and treatment of liquids from DNAPL seeps in the Roseburg excavation.

- Implementing institutional controls to prevent exposure to waste left in the DNAPL zone. These controls would include 1) limiting future land uses to appropriate industrial uses; 2) restricting access to and use of contaminated groundwater; 3) prohibiting activities that would disturb the integrity of the remedy including appropriate prohibitions on activities that would disturb the soil and/or any cap placed upon such soil; 4) requiring appropriate handling of excavated materials; 5) providing for appropriate notice that hazardous wastes remain on site; and 6) prohibiting other activities which could cause a potential threat to human health or the environment.

Modification for Disposal of Treated Water

- Addition of the option of direct discharge to Beaughton Creek for treated water based on NCRWQCB regulatory actions to require treatment of water to best practicable methods. The preferred disposal option continues to be reuse on Roseburg's log decks as described in the 1990 ROD. Reuse on the log decks would reduce water diversions from Beaughton Creek, which is water-limited during the dry season.

Additional Modifications to Soils Remedies

- Surface Soils Containing Inorganic Concentrations above Background and below the 1990 ROD Subsurface Soil Excavation Standard - Covering these soils with a protective asphaltic concrete surface, rather than excavating and reburying the soils on-site at a depth greater than two feet. This modification will provide equal long-term protectiveness while minimizing short-term risks associated with excavation and handling of soils.

- Modification of Procedure to Verify Attainment of Soils Treatment Standard - Modifying the 1990 ROD leachate test for soils to be placed in a lined disposal cell (equivalent to Resource Conservation and Recovery Act [RCRA] disposal cells). The new test will use deionized water rather than a citric acid buffer for the leaching solution. The test will be used to demonstrate that soils have met the numerical limits selected in the 1990 ROD. Because testing has shown that Site soils are not acidic, deionized water, which is neutral, may be more representative of Site conditions. Additionally, as this modification will apply only to soils to be placed in the RCRA-equivalent disposal cell, there is no increased threat to humans or groundwater.

- Modification of Biotreatment Implementation - Broadening the implementation options for biotreatment to allow treatment in place (in situ), with appropriate monitoring and controls. However, all biotreated soils (with possible exception of Area B soils as explained below) will be excavated and placed in a lined RCRA-equivalent disposal cell.

- Alternative Treatment and Disposal Options for Area B Soils - Area B soils are contaminated with organics and are believed to have been excavated from the DNAPL zone and moved to their current location when Roseburg began preparations for new building construction. EPA has selected treatment standards for Area B based on groundwater protection concerns. In addition, all Area B surface soils will be covered by two feet of clean soil. EPA will evaluate in situ bioventing as the treatment technology for Area B soils. EPA and will also evaluate the results of modeling and/or other studies to assess the impact of contaminated soils on groundwater in order ensure that the cleanup levels achieved by bioventing will be protective of groundwater. If EPA concludes that the cleanup levels achieved by bioventing will be protective of groundwater, then Area B soils will remain in place after treatment has been completed. If EPA concludes that the cleanup levels achieved by bioventing will not be protective of groundwater, then the remedy will be biotreatment and subsequent disposal in a RCRA-equivalent disposal cell. Area B soils to be placed in the RCRA-equivalent cell must comply with the 1990 ROD treatment standards using the modified leachate test described above.

- Modified Excavation Standards for Subsurface Soils Contaminated with Organics - EPA has modified the 1990 ROD subsurface soil excavation standards for organics-contaminated soils outside the DNAPL zone in order to ensure that they remain protective of groundwater. The new subsurface soil excavation standards are the same as the Area B treatment standards and will apply to all soils located outside the DNAPL zone which are contaminated with organics (including Area B soils, if bioventing is not successful and the soils are ultimately excavated). As with Area B, EPA will evaluate the results of modeling and/or other studies to assess the impact of contaminated soils on groundwater. In accordance with the remedy modifications described above, subsurface soils within the DNAPL zone will not be excavated. Excavated soils to be placed in the RCRA-equivalent disposal cell must comply with the 1990 ROD treatment standards using the modified leachate test described above.

- Designation of Corrective Action Management Units - EPA has designated three features of the remedy as RCRA Corrective Action Management Units (CAMUs): the RCRA-equivalent disposal cell, the soil staging and fixation area, and the slurry wall construction zone. All soils that have been excavated and treated and all soils that have undergone in situ biotreatment (other than successful bioventing) will be disposed of in a RCRA-equivalent disposal cell that complies with the RCRA landfill requirements, including groundwater monitoring, leachate control, and closure requirements. Neither placement of remediation wastes into the RCRA-equivalent cell, nor temporary placement of soils in the soil staging and fixation area or slurry wall construction zone, nor incorporation of contaminated soils into the slurry wall trench will constitute land disposal of hazardous wastes because EPA has designated each of these areas as a CAMU.

Modification for Handling of Contaminated Soils Uncovered during Operation and Maintenance

- Handling of Soils during Operation and Maintenance - A soils handling plan will be developed and approved by EPA to address instances where building decommissioning/construction activities, routine maintenance, or other ground intrusive activities on site may occur.

Modification for Ditch Sediments

- Revised Remedy for Ditch Sediments - The requirements for excavation, treatment, and disposal of contaminated sediments within drainage ditches discharging Site runoff into Beaughton Creek is modified in light of the fact that natural flushing and attention are reducing the concentrations of contaminants. The ditch sediments will be allowed to continue to degrade naturally to the standards specified in the ROD. However, stream sediments will continue to be monitored and the areas of concern in the stream will be posted with cautionary signs. In addition, the discharge and surface water runoff from the site will continue to be monitored to ensure protectiveness.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. The revised soil and groundwater remedies utilize both containment and treatment technologies to reduce toxicity, mobility, or volume of contaminants. However, because treatment of the DNAPLs in the TI zone was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principle element of the remedy for groundwater and subsurface soils in the DNAPL zone.

Because the remedies will result in hazardous substances remaining on-site above health-based levels, EPA will conduct a review pursuant to Section 121(c) of CERCLA, 42 U.S.C. º9621(c), within five years after commencement of remedial action to insure that the remedy continues to provide adequate protection of human health and the environment.

II. DECISION SUMMARY

1.0 SITE NAME, LOCATION AND DESCRIPTION

The J.H. Baxter Superfund site (Site) is located at the northeastern border of the city of Weed in Siskiyou County, California (see Figure 1-1). The Site includes the property owned by J.H. Baxter & Company (Baxter) and Roseburg Forest Products (Roseburg). Baxter operates a wood treatment plant, and Roseburg operates a lumber mill and veneer plant. Wood treatment is intended to protect wood from deterioration due to insects and fungi, using a variety of chemical compounds including creosote, arsenic, chromium, copper, zinc, and pentachlorophenol. The companies that previously have been responsible for wood treatment operations (since 1937) include American Lumber and Treatment Company, and International Paper Company (IP). The Potentially Responsible Parties (PRPs), as identified by the U.S. Environmental Protection Agency (EPA), have formed the Weed Remediation Group (WRG).

The Site is bordered on the west and northwest by residential areas of Weed, to the north by the Angel Valley Subdivision and Lincoln Park, to the east by mixed woodlands, and to the south by irrigated pasture (Figure 1-2). Beaughton Creek runs through the eastern portion of the Site. For a description of the regional setting, refer to Section 1.3.1 of the 1990 Feasibility Study (FS) (SAIC 1990).

The geology and hydrogeology of the Site have been presented in several documents both prior to and since the issuance of the 1990 FS and Record of Decision (ROD) (EPA 1990). These include the Remedial Investigation (RI) report (CDM 1989), the Characterization and Treatability Study Report of Results (C&TS) (Grant 1993), and the Ground Water Remedial Design Investigation Report (GWRDI) (Grant 1995). This section summarizes the 1990 ROD, describes in general terms what has been learned about the Site since the 1990 ROD, and briefly summarizes the geology and hydrogeology. Stratigraphic units and aquifer characteristics are described in detail in Section 1.2.4 of the Final Focused Feasibility Study and Evaluation of Technical Impracticability (FFS) (Bechtel 1997).

1.1 Summary of Geology and Hydrogeology

The RI Report defines five stratigraphic units at the Site:

- Artificial fill
- The Younger Clastic Assemblage (YCA)
- The Pre-Shastina Alluvial Assemblage (PSA)
- The Older Clastic Assemblage (OCA)
- Bedrock

The GWRDI reports several water-bearing zones separated by unsaturated volcanic flows. Based on the previous work conducted at the Site, published literature, and work conducted at the Site during the GWRDI, the following stratigraphic sequence is currently thought to occur at the Site:

- Artificial fill
- Recent Alluvium
- Shastina Pyroclastic Flow
- The PSA
- The OCA
- Older pyroclastic flow deposits

While similar to what was thought to exist at the time of the RI Report, this stratigraphic sequence does differ in one important aspect. As described in the GWRDI Report, a distinct competent bedrock unit defining the base of the hydrologic system has not been found within at least several hundred feet of the surface. Therefore, a bedrock unit is not included in the current understanding of Site stratigraphy.

There are two main aquifers at the Site. The first aquifer is referred to as the uppermost aquifer. The second aquifer is described as the lower aquifer. The two aquifers are separated by the OCA aquitard. Depth to ground water at the Site varies from a few feet below ground surface (bgs) to over 20 feet bgs. Hydrographs from monitoring wells indicate that there is a persistent downward vertical gradient across the Site between the two aquifers. The head difference can be as much as 20 feet.

The most important unit of the subsurface at the Site is the OCA. Generally, the OCA has been observed to act as an effective barrier to vertical contaminant migration from the upper aquifer to the lower aquifer, as noted in the RI report, C&TS report and the GWRDI report.

1.2 Historical Sources of Contamination

Wood treatment operations at the Site were initiated in 1937. A detailed history of Site operations was included in the original FS. Therefore, only a summary of the contamination sources as they relate to the Dense Non-Aqueous Phase Liquid (DNAPL) zone is presented in this section.

Waste disposal, handling, and discharge practices over more than 55 years of operation at the Site have released wood treatment-related hazardous substances to Site soil, ground water, and surface water. Wastes generated at the Site, consistent with those at wood treatment facilities, include retort drippings, tank and retort sludges, process water, wastewater, drying area drippings, storage area drippings, empty containers, and spilled raw preservative compounds. Source areas within the DNAPL Zone are shown in Figure 1-3, and are briefly described below.

Tank Berm Area Around the 500,000-Gallon (No 3) Tank - A 500,000-gallon tank was installed in 1936 to store creosote. Spills of creosote from the tank have been reported historically. The RI report also noted that no attempt was made to cleanup early spills and creosote was allowed to seep into the ground. The tank was converted to a process-water surge tank in 1983.

The bermed area was reported to have received water from process waste water vaults and process water. This area was reported to have been used for disposal of sludges from storage and process tanks. Sludges were removed from the bermed area in 1985; however, contaminated soils remain.

Retort and Process Area - Several leaks and direct discharges of wood treatment chemicals from the process area onto the western portion of the property have been reported from the 1940s through 1970s. Also, an underground tank existed below the retorts, which at one time received used treatment solutions. This underground tank was reported to have been filled with ground water before it was closed.

Buried Pond Area - Unlined settling ponds and pits containing wood treatment salts, and dip ponds containing creosote were reported to have been present at the north end of the wood treatment property near the Roseburg Excavation. These ponds and pits received excess treatment chemicals from the retorts, and were used by local residents to dip fence posts. It is thought that these unlined ponds and pits have probably contributed to the presence of creosote observed within the Roseburg Excavation.

Former Oil/Water Separator/Creosote Pit Area - An oil/water separator was installed at the Baxter property in 1955 to recover creosote product. Discharges and oil spills from the unit were reported as well as a leak in the inlet pipe. The oil/water separator was taken out of service in 1984.

During the 1960s, Baxter plant's sewage system and wastewater from the retorts drained into IP's log ponds. To reduce this drainage, Baxter dug a pit to contain 500 cubic feet of waste, however, overflows from the pit and oil/water separator continued to discharge into the log ponds. The pit was closed and filled in 1981. Baxter, at a later date, also cleaned the ditch (shown as the "Possible Discharge Ditch to Log Ponds", in Figure 1-3) that discharged to the pond, filling in the ditch with soil and installing a culvert.

Former Waste Water Vaults - Two concrete-lined vaults were used to hold wastewater from oil and water-based chemical solutions, condenser water, cooling water, spillage drainage, wash water from retorts, and runoff. These wastewater vaults were used between 1975 and 1984/85, when they were decommissioned.

From 1975 to 1983, water entering the wastewater vaults was piped to irrigation sprinklers and sprayed on to an open field adjacent to the southern edge of the facility. However, excess water was reported to have been discharged into Site culverts, into the tank berm area, and directly onto the ground surface when capacity of the spray system was exceeded.

The process of transferring wood treatment related chemicals from rail tank cars to facility storage vessels was also reported as a source of spills at the Site. There are miscellaneous reports of spills during unloading during the 1950s. There are also reports of leaks from failing transfer hoses, and the loss of creosote from a tank car.

1.3 Pre-1990 ROD Investigations

Remedial investigations at the Site began in 1983 at the request of the North Coast Regional Water Quality Control Board (NCRWQCB) and the California Department of Health Services (DHS), now the California Environmental Protection Agency Department of Toxic Substances Control (DTSC). Investigation results at that time indicated that Site soils, surface water runoff, and ground water contained elevated levels of arsenic, creosote, and pentachlorophenol (PCP) (Table 1-1). In 1984 EPA proposed that the Site be included on the National Priorities List (NPL).

EPA initiated the RI of the Site in 1987 and released the RI report in 1989 (CDM 1989). EPA then performed the FS (SAIC 1990) based on the RI. The 1990 FS addressed all impacted media at the Site including surface soils, subsurface soils, ground water, surface water, and sediment. EPA issued the ROD (EPA 1990) on September 27, 1990 based on the results of the April 27, 1990 FS. EPA then issued Unilateral Administrative Order 91-92 (UAO) with a Scope of Work (SOW) on August 19, 1991 that detailed the remedial actions to be conducted at the Site (EPA 1991).

1.4 Summary of 1990 ROD

The 1990 ROD presents the selected remedial actions for the J.H. Baxter Superfund Site in Weed, California, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision was based on the administrative record file for this Site as of 1990. The State of California concurred with the selected remedies.

The 1990 ROD documents that actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response actions, may present an imminent and substantial endangerment to public health, welfare, or the environment.

The response actions selected by the 1990 ROD address the documented principle public health and environmental threats from the Site contamination. Actions were selected to address the contaminated soils, groundwater, and surface water. The major components of the selected remedy include the following:

- Extraction of the contaminated groundwater followed by biological treatment and chemical precipitation, polishing, and disposal. The preferred disposal method for the treated groundwater was reuse on the Roseburg log decks. Other disposal options included: reinjection to groundwater, release to subsurface drains or trenches, industrial process use, and/or disposal to percolation ponds. This ROD Amendment incorporates the slurry wall as a component of the design for the groundwater remedy in order to meet the objectives of the 1990 ROD. The slurry wall was added to enhance the restoration of groundwater outside of the DNAPL Zone. The remedy, without a slurry wall, will not be protective of human health and the environment.

- Excavation of the organic contaminated soils and biological treatment in lined treatment cells with disposal after treatment in a Resource Conservation and Recovery Act (RCRA)-equivalent cell.

- Excavation of the inorganic soils and chemical fixation followed by on-site disposal in lined treatment cells for treated soils designated as hazardous waste.

- Excavation of the combined organic/inorganic soils, biological treatment in treatment cells, chemical fixation, and on-site disposal into a lined RCRA-equivalent cell.

1.5 Post 1990 ROD Investigations and New Site Information since 1990 ROD

Since the 1990 FS was prepared and the 1990 ROD was issued, a significant amount of additional data have been obtained through further investigation and characterization work conducted at the Site. Under EPA's direction, the WRG undertook C&TS investigations in 1992-1993 (Grant 1993) and the GWRDI in 1993-1994 (Grant 1995) to provide specific information necessary to design the remedies selected by EPA in the 1990 ROD. These data have contributed to a better understanding of the extent of contamination, especially the DNAPLs in the subsurface.

During post-1990 ROD ground water remedial design characterization, the WRG issued the C&TS (Grant 1993). EPA instructed the WRG to better define the extent of DNAPLs in the saturated and unsaturated (vadose) zone soils. The WRG addressed the DNAPL extent in the GWRDI Report issued in February 1995 (Grant 1995). The results of the studies confirmed that creosote contamination at this Site is present in soil and groundwater and in the form of DNAPLs above and below the groundwater table. However, the results indicated DNAPLs extend throughout a much wider and deeper portion of the Site than was previously thought, and that subsurface soil contamination was also much more widespread. The studies identified two additional areas of soils with organics contamination: the Roseburg excavation and Area B. These reports found significant increases in the estimated volume of contaminated soil over the 1990 ROD estimate. The 1990 ROD estimated 4 1,000 cubic yards of contaminated soil subject to cleanup. This total included both surface soil and subsurface soil to a depth of 12 feet bgs (the depth of the water table). Post-1990 ROD investigations estimated 201,500 cubic yards of impacted soil in the unsaturated zone (surface soil and subsurface soil above the water table) (Bechtel 1997). These increases, together with questions concerning the potential effectiveness of the chosen remedy, caused EPA to undertake the FFS for the DNAPL-impacted area.

In addition to the significant increase in the understanding of the volume and extent of DNAPLs in the subsurface, EPA's understanding of the technical issues for remediation of DNAPL-contaminated sites has continued to evolve since the 1990 FS (SAIC 1990) was completed. These issues have been addressed in several publications, including a study by the National Research Council (NRC 1994). In light of these new Site data, in response to a request from the PRPs, i.e., WRG, and consistent with the 1995 Superfund Administrative Reforms (EPA 1995), EPA developed the FFS (Bechtel 1997). The FFS reevaluated the remedial action alternatives for DNAPL-impacted subsurface soils and ground water at the Site.

On the basis of the FFS analysis, EPA concluded that it is not possible to achieve the 1990 ROD cleanup standards for groundwater within the DNAPL Zone and designated this area of the Site as the Technical Impracticability (TI) zone for groundwater cleanup. This ROD Amendment documents a waiver of the ground water cleanup standards set forth in the 1990 ROD, based on the technical impracticability from an engineering perspective for the DNAPL Zone. The factual basis for proposing a TI waiver of the ground water cleanup standards is set forth in the TI Evaluation Summary in the FFS.

2.0 SUMMARY OF SITE CHARACTERISTICS

Waste disposal, handling, and discharge practices over more than 50 years of plant operation have resulted in Site soil, groundwater, surface water, and sediment contamination with a variety of chemicals used in wood treatment operations. These include the F032. F034 and/or F035 hazardous wastes listed pursuant to 40 CFR Part 261 of the RCRA regulations (as implemented through 22 California Code of Regulations 66261) as well as D004, D007 and D037 characteristic hazardous waste. The F032, F034 and F035 listed wastes, which are related to wood preserving operations, were listed after the date of the ROD. See 57 Federal Register 61492 (December 30, 1992). This ROD Amendment recognizes this new listing because EPA has concluded that this is necessary to ensure that the remedy remains protective of human health and the environment. Arsenic, carcinogenic polycyclic aromatic hydrocarbons (PAHs), pentachlorophenol and dioxins are the primary contaminants of concern. Chromium, copper, zinc, benzene and noncarcinogenic PAHs are also present at the Site.

2.1 Nature and Extent of Contamination

This section describes the current understanding of contaminant nature and extent in soils and groundwater throughout the Site and the volume of impacted saturated and unsaturated soils within the DNAPL Zone that will be contained by the slurry wall. This understanding is based on data from the C&TS, (Grant 1993), the Draft Preliminary (90 percent) Soil Remedial Design (Grant 1995a), GWRDI (Grant 1995), and the ENVIRON Report (ENVIRON 1995). Groundwater and subsurface soils that are within the DNAPL Zone are addressed in depth in this ROD Amendment. Surface soil both within and outside of the slurry wall and subsurface soil outside of the slurry wall will be cleaned up in accordance with the 1990 ROD (with the modification described in Section 8.3.2 of this ROD Amendment). Only a brief discussion of soils is presented in this section of the ROD Amendment.

2.1.1 Groundwater

Groundwater sample results showed the presence of a creosote and arsenic plume, originating at the Baxter wood treatment area and extending to the northwest into the Roseburg property towards the Angel Valley subdivision (Figures 1-3 and 4-2 of the 1990 ROD). Arsenic at 1,740 parts per billion (ppb) and creosote compounds at 233,000 ppb were detected in Roseburg monitor well RMWI, which was located immediately downgradient of the wood treatment property and 1,600 feet upgradient of the subdivision. A portion of this arsenic and creosote plume is being captured by the Roseburg french drain. According to the RI Report and December 1989 monitoring data, wells downgradient of the french drain and adjacent to and within the subdivision did not show the presence of Site contaminants.

2.1.2 Soil

Although widespread arsenic contamination (40 to 38,500 parts per million [ppm]) is generally limited to surface soils (to a depth of at least one foot), arsenic contamination extended deeper (up to 5 feet) below the retort, wastewater impoundments, and tank-bermed areas of the property. Contamination of surface soils by creosote (below detection limit [ND] to 10,384 ppm) and pentachlorophenol (ND to 2,440 ppm) was less widespread than the inorganic contamination, but much deeper. Organic contamination below the tank berm, retort, and wastewater vault areas extends to at least 30 feet below ground surface. Pre 1990 ROD investigations found a subsurface creosote body (DNAPL) of up to 15 feet in thickness under the wood treatment property. The DNAPL extent was further characterized in the C&TS (Grant 1993) and the GWRDI Report (Grant 1995). These reports found significant increases in the estimated volume of contaminated soil over the 1990 ROD estimate. The 1990 ROD estimated a total volume of contaminated soil above the water table (in the unsaturated zone) of 41,000 cubic yards divided into the following subunits:

- Soils contaminated with inorganics only 18,750 cubic yards
- Soils contaminated with organics only 12,500 cubic yards
- Soils contaminated with organics and inorganics 9,380 cubic yards

The current understanding of contaminant extent and volume of impacted saturated and unsaturated soils in the DNAPL Zone is based on data from the C&TS, (Grant 1993), the Draft Prefinal (90 percent) Soil Remedial Design (Grant 1995a), GWRDI (Grant 1995), and the ENVIRON Report (ENVIRON 1995). These sources estimated a total volume of contaminated soil in the unsaturated zone of 201,500 cubic yards divided into the following subunits:

- Soils contaminated with inorganics only 50,500 cubic yards
- Soils contaminated with organics only 130,500 cubic yards
- Soils contaminated with organics and inorganics 20,500 cubic yards

The GWRDI estimated the portion of these contaminated unsaturated soils that are impacted by DNAPL to be 27,000 cubic yards. The FFS assumed that these 27,000 cubic yards are included as part of the total extent of the unsaturated soil impacted by all contaminants of concern as identified in Figure 2-1.

One of the objectives of the GWRDI was to determine the extent of DNAPL contamination in the subsurface in the saturated zone as well as the unsaturated zone. The 1990 ROD did not address contaminated soil in the saturated zone as the remedy only addressed soil above the water table. The data the GWRDI collected were not always conclusive and they are subject to considerable variation in interpretation. Figure 2-2 shows the various interpretations of DNAPL extent in the subsurface that were prepared by three different WRG consultants using nearly the same data set.

In order to evaluate remediation alternatives for DNAPLs in the saturated zone, the FFS used minimum and maximum volumes of impacted saturated soil of 98,000 cubic yards and 1,210,000 cubic yards, respectively. The FFS used a range of volumes derived from estimates of the minimum and maximum possible contaminated soil because of the problems in identifying the extent of DNAPL impacted soil in the saturated zone, the associated uncertainty in estimating its volume, and the lack of other data.

The different depictions of DNAPL presence shown on Figure 2-2 illustrate the difficulty and uncertainty in locating and identifying DNAPL in the subsurface. Such variations in interpretations are not unexpected. The difficulty in locating and identifying DNAPL in the subsurface is well recognized and is documented in numerous publications. DNAPL Site Evaluation (Cohen and Mercer 1993), prepared for EPA's Robert S. Kerr Environmental Research Laboratory, provides in-depth discussions regarding these and other DNAPL location and identification issues.

2.2 Soil Stratigraphy and Contaminant Migration

Each of the stratigraphic units that are considered to occur within the DNAPL Zone is discussed below.

Artificial Fill

Fill occurrence at the Site varies, but generally can be grouped into three categories:

- Gravely sand derived from local quarries
- Gravely sand and log debris
- Gravely sand, construction debris, and associated Site soils

Within the DNAPL Zone there is fill from nearby quarries in the Baxter property, the Roseburg Excavation, and the French Drain. This fill typically is a gravely sand that can be difficult to distinguish from the Shastina Pyroclastic Flow, and ranges from less than I foot to 18 feet thick within the DNAPL Zone.

Recent Alluvium

Recent alluvium deposits do not occur within the DNAPL Zone.

Shastina Pyroclastic Flow

The most dominant geologic feature in the Weed, California area is the Shastina Pyroclastic Flow. Based on the stratigraphic description the YCA unit noted in the RI report is roughly equivalent to the Shastina Pyroclastic Flow. It is a poorly-sorted, unstratified pyroclastic debris flow. It consists of a silty, gravely sand to sandy unit. Gravel is angular to subangular, and can be greater than 2.5 inches in diameter. Locally it contains alternating beds of silty sand, sandy silt, and rounded gravel. The transition to the underlying PSA occasionally is marked by a sandy-silt to silty-sand layer. The Shastina Pyroclastic Flow has a distinctive pinkish-brown to pinkish-gray color. It ranges up to 22 feet thick within the DNAPL Zone.

Pre-Shastina Alluvial Assemblage

The PSA is generally a well-sorted unit of fluvial origin. It consists of fine to medium sand to silty sand and gravely medium coarse sand. Gravels in this unit are generally less than one inch in diameter. Locally on the Site the PSA can be poorly sorted and very silty, which may represent transitional environments of a fluvial system. The PSA is brown to gray and can have a reddish or greenish hue. The PSA appears to be persistent across the DNAPL Zone and ranges from 3 to 18 feet thick.

Older Clastic Assemblage/Aquitard Layer

The OCA is a distinctive unit that is present beneath the PSA. The OCA caps the older pyroclastic flows and the lower aquifer. The OCA acts as the confining layer that separates the uppermost aquifer from the lower aquifer and constitutes the lower boundary of the DNAPL Zone. The OCA slopes downward toward the northwest end of the DNAPL Zone. In air rotary drill cuttings, the OCA is described as a brown gravely clay. In split-spoon samples, the OCA is described as dense greenish-gray silt or sandy silt. The boring logs indicate that the OCA ranges in thickness from 2 feet near the southern end of the DNAPL Zone to approximately 29 feet, near the northern end of the DNAPL Zone.

The most important unit of the subsurface within the DNAPL Zone is the OCA. The OCA has been observed to act as an effective barrier to vertical contaminant migration from the upper aquifer to the lower aquifer, as noted in the RI report, C&TS report and the GWRDI report. However, the OCA in localized areas may not be effective in mitigating the downward migration of contaminants. For example, Site contaminants have been observed at two locations in the Lower Aquifer, at Well B-1 and Well B-15. The WRG attributed the observed contamination to faulty installation of Well B-1. However, as the extent of the contamination in the Lower Aquifer is not delineated, additional pathways, including permeable zones within the OCA, cannot be ruled out. As of this writing, Well B-1 has been properly abandoned and a replacement well, B-1R, has been drilled. As an interim remedial measure to address the contamination in the Lower Aquifer, extraction of ground water from Well B-1R has been initiated and continues to date. The WRG is evaluating the effectiveness of pumping Well B-1R and will propose modified plans to EPA to address the observed contamination in the lower aquifer.

Despite the ground water impact observed in these two well locations in the lower aquifer, current understanding at the Site is that, within most of the DNAPL Zone, the OCA appears to be an effective barrier. Therefore, the DNAPL Zone can be considered to be bounded, at depth, by the OCA, and does not include the Lower Aquifer or subsurface soils below the OCA.

The uppermost aquifer ground water flow direction across the Site is generally to the north-northwest. The proposed slurry wall would isolate the uppermost aquifer ground water within the DNAPL Zone from the remainder of the uppermost aquifer at the Site. Therefore, ground water level and flow within the DNAPL Zone would be primarily influenced by conditions established after the construction of the proposed slurry wall and extraction system.

2.3 Primary and Secondary Contaminants of Concern

For the Site, arsenic, carcinogenic polycyclic aromatic hydrocarbons (PAHs), PCP, and dioxins have been identified as the primary contaminants of concern (COCs). All of these contaminants are known or suspected carcinogens and are present in each medium at concentrations exceeding health standards. Therefore, these contaminants are considered primary health threats. Chromium, copper, zinc, benzene, and non-carcinogenic PAHs have been identified as secondary contaminants of concern. These contaminants are considered to be less toxic than the primary COCs, are not widespread, are relatively immobile, and/or do not consistently exceed health-based standards.

3.0 SUMMARY OF SITE RISKS

EPA prepared an Endangerment Assessment to document the potential risks associated with the actual or threatened releases of hazardous substances from the Site. The 1990 ROD provided a summary of the information found in this document (U. S. Environmental Protection Agency, April 30, 1990. Endangerment Assessment. Baxter/IP/Roseburg Site. Weed. California, Volumes 1 and 2, EPA WA 205-9L74). The following paragraphs briefly summarize this information and provide additional risk assessment results for PAH compounds and PCP for the DNAPL Zone.

3.1 Health Risks

As described in the 1990 ROD, the risk assessment identified chemicals of concern for human receptors. The chemicals were selected primarily on the basis of the concentration detected, or the known or suspected toxicological properties of the substance. The wood treatment inorganic (metal) chemicals of concern include arsenic, chromium, copper, and zinc, with arsenic being identified as a high threat contaminant. The organic chemicals of concern include carcinogenic and non-carcinogenic PAHs, PCP, tetrachlorophenol, chlorinated dibenzo dioxins and chlorinated dibenzo furans. Carcinogenic PAHs, PCP, and dioxins have been identified as high threat contaminants.

The evaluation performed under the risk assessment indicated that, under current land-use conditions, the principal exposure pathways by which human receptors could potentially be exposed to Site contaminants within the DNAPL Zone are direct contact by workers at the Baxter facility with contaminated soils, and inhalation of fugitive dust emissions on and off site. It is anticipated that future land use of the site will continue to be industrial. Within the risk assessment, the exposure point concentrations of Site chemicals were estimated using measured concentrations or models to estimate fugitive dust emissions.

The risk assessment evaluated two main baseline (No Action) scenarios: continued use of the property as industrial (wood treatment) and future-use development of the property as residential. The highest current-use potential health risk due to arsenic, PAHs, and dioxin was identified as exposure by workers at the Baxter Facility to the soil by direct contact (Plausible Maximum Case risk of 8 x 10 -2). Total maximum risk to site workers from all contaminants and pathways was identified as 1.4 x 10 -1. The maximum non-carcinogenic risks from direct contact with soil by workers at the Baxter Facility exceeded a hazard index of 1.0. Higher health risks are associated with future residential use of the Site (see 1990 ROD Table 6-3).

In the Endangerment Assessment (ICF/Clement 1990) conducted as part of the RI, the principal exposure pathways by which human receptors could potentially be exposed to Site contaminants were identified as:

- Direct contact with contaminated soils
- Inhalation of fugitive dust emissions
- Direct contact with surface water and sediments
- Ingestion of ground water

The ROD Amendment describes the remedy for direct contact with contaminated surface soils, inhalation of fugitive dust emissions, and direct contact with surface water and sediments. The remedy to remove these exposure pathways includes:

- Paving where surface soil exceeds the surface soil excavation standards (Table 4-2) and both excavation and paving where surface soil exceeds the subsurface soil excavation standard set forth in Table 4-2. Excavated soils to be biotreated and/or fixed to the treatment standards identified in Table 4-2, and disposed of in an onsite RCRA-equivalent disposal cell. Excavation will be conducted in units of limited size to minimize the amount of exposure to contaminated soil at any one time. Figure 3-1 shows the delineation of soil excavation units.

- In situ remediation of Area B soils. Area B surface soils will be covered by two feet of clean soil. (If bioventing is not viable, the remedy will be biotreatment and subsequent disposal in a RCRA-equivalent cell.)

- Natural attenuation of contaminated Beaughton Creek sediments to the standards specified in Table 4-2. Post 1990 ROD monitoring of Beaughton Creek indicates natural flushing and attenuation of contaminated sediments has occurred. This natural attenuation will continue with no adverse environmental impact and will result in the concentration of contaminants of concern dropping to below sediment excavation standards.

- Site regrading activities to improve surface water runoff control.

After remediation of surface soils across the Site, the remaining exposure pathways for contaminants in subsurface soils within the DNAPL Zone would be contact with subsurface soils during future Site construction activities and ingestion of ground water. These pathways will be addressed by the imposition of institutional controls as described in Section 7.3 of this ROD Amendment and by the development and approval by EPA of a soils handling plan. Contaminated groundwater outside the DNAPL Zone will be remediated in accordance with the 1990 ROD.

3.2 Environmental Risks

As discussed in the Endangerment Assessment (ICF/Clement 1990), wildlife use of the DNAPL Zone is expected to be limited because of industrial development. Once the remedy has been completed, there will no longer be a potential for wildlife to be in direct contact with contaminated surface soils.

3.3 Conclusion

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response actions selected in the 1990 ROD, as modified by this ROD Amendment, may present an imminent and substantial endangerment to public health, welfare, or the environment. The current risk afforded by Site chemicals that have been and continue to be released into the environment represents a total cancer risk of 1.4 x 10 -1 and a maximum non-carcinogenic risk (Hazard Index) of 11.1 to current workers. If the selected remedy is not implemented, total future Site risk to children is 6 x 10 -1, while the total future risk to adults is 8.6 x 10 -1. For known or suspected carcinogens, acceptable exposure levels are generally those concentrations that represent an upper bound lifetime cancer risk to an individual of between 10 -4 and 10 -6. For systemic toxicants, acceptable exposure levels represent concentration levels to which the human population, including sensitive subgroups, may be exposed without causing deleterious effects. This is generally interpreted as a level which will not exceed a Hazard Index of one.

4.0 ENFORCEMENT ACTIVITIES

This section presents a brief summary of remedial activities. For more detailed information, see the references cited throughout the text. Emphasis in this section is on data which impact the DNAPL Zone obtained since EPA issued the 1990 FS and ROD. This area of the Site is also referred to as the Technical Impracticability (TI) zone for groundwater cleanup.

4.1 1990 ROD Standards

The 1990 ROD established excavation and treatment standards for each chemical of concern based on an evaluation of the risk to human health and the environment, federal and state Applicable or Relevant and Appropriate Requirements (AGARS), and background considerations. The 1990 FS (SAIC 1990) and ROD (EPA 1990) should be referenced for the methods and criteria used in the evaluation. Table 4-1 shows the 1990 ROD excavation and treatment standards for contaminated soils and sediments at the Site and the 1990 ROD aquifer cleanup and ground water treatment standards and corresponding leachate test procedures.

4.2 1990 ROD Remediation Requirements and Remedial Design

The 1990 ROD for the Site identifies components of the remedy according to media and contaminant type. For ease of reference, this ROD Amendment will describe the remedy using the terminology developed in the UAO SOW. The UAO described seven major components and one interim component of the remedy as follows:

- Component 1 -Excavation, treatment, and on-site disposal of soils contaminated with inorganics only
- Component 2 -Excavation, Treatment, and on-site disposal of soils contaminated with organics only
- Component 3 -Excavation, treatment, and on-site disposal of soils contaminated with organics and inorganics
- Component 4 -Extraction of contaminated groundwater, treatment to remove inorganics

and organics, and discharge of treated groundwater

- Component 5 -Control and treatment of contaminated runoff to prevent movement of Site chemicals into Beaughton Creek

- Component 6 -Excavation, treatment, and disposal of contaminated sediment within drainage ditches discharging Site runoff into Beaughton Creek

- Component 7 -Perform sediment and trout sampling and other appropriate aquatic organism sampling, as necessary, of Beaughton Creek; Perform contaminated sediment removal or other remedial measures as determined by EPA

- Component 8 -Dust control measures at the J.H. Baxter wood treatment facility

Components 5, 7, and 8 are not modified by this ROD Amendment. For more detail, refer to the UAO SOW (EPA 1991) and 1990 ROD. Component 6 is modified as described in Section 8.3.8 of this ROD Amendment.

4.3 1990 ROD Remedy Implementation Status for Components within the DNAPL Zone

The WRG is responsible for implementing the 1990 ROD under the UAO. The current status of these activities for the DNAPL Zone is summarized below.

4.3.1 Subsurface Soils in the DNAPL Zone

Subsurface soils within the DNAPL Zone are defined to extend from greater than 2 feet bgs through both unsaturated and saturated zones to the OCA. Subsurface soils are composed mainly of soils contaminated with organics only (Component 2) and soils contaminated with organics and inorganics (Component 3). Remedial design investigations conducted after the 1990 ROD have indicated that the extent of affected subsurface soils above and beneath the ground water table is much greater than initially estimated in the 1990 FS (Grant 1993, Grant 1994, Grant 1995).

A study conducted by ENVIRON Corporation for the WRG questioned the effectiveness of sub-surface excavation to restore ground water within a reasonable time frame (ENVIRON 1995). While EPA did not agree with some of the details in this report, EPA did agree to suspend Remedial Design (RD) schedules for ground water and subsurface soils in the DNAPL Zone while developing the FFS.

4.3.2 Ground Water

After the 1990 ROD was signed and prior to the issuance of the UAO, an interim ground water extraction system and a ground water treatment plant (Baxter WTP) were built by the WRG under orders from the NCRWQCB. The primary function of the interim system has been to treat surface water runoff. The Baxter WTP includes an oil/water separator, metals precipitation, biological treatment, and activated carbon adsorption. As described in the Groundwater Remedial Design Report (RDR) (TRC 1996b), the capacity of the Baxter WTP would be expanded as needed to treat water from future extraction wells. There is also a 50 gpm treatment plant at the Roseburg property that is mainly utilized to treat surface water runoff.

The GWRDI investigated the extent of ground water contamination. The final remedy for the ground water outside of the target zone is under design. A slurry wall around the DNAPL-contaminated area is an element of the proposed ground water design that enhances its efficacy and cost-effectiveness. This ROD Amendment assumes the presence of the ground water remediation system and slurry wall as a base case.

4.4 Discharge Standards for Beaughton Creek

The 1990 ROD did not provide for the discharge of treated groundwater to Beaughton Creek. The ROD Amendment recognizes this as a discharge option, although it is the last and least favored option. The preferred option remains discharge to the Roseburg log decks. The groundwater treatment standards for discharges to Beaughton Creek are AGARS and are provided in Table 4-2.

5.0 COMMUNITY PARTICIPATION

The EPA has encouraged public participation throughout the Remedial Investigation/Feasibility Study (RI/FS) and Remedial Design/Remedial Action (RD/RA) stages of the project in accordance with CERCLA requirements. Public participation requirements for EPA's selection of the final remedy as defined under CERCLA Section 113(k)(2)(B)(i-v) and 117(a) were met by the activities described below.

Informational meetings and Site tours have been held during the RD/RA phase, with representatives of public agencies and local citizen groups invited to attend. RD/RA documents, including the C&TS (Grant 1993), the Draft Preliminary Remediation Design Plan (Grant 1994), the GWRDI (Grant 1995), and the FFS (Bechtel 1997) were placed in the Administrative Record for the Site.

The Proposed Plan for the modifications to the groundwater and soils remedy was distributed using EPA's mailing list for this Site. A public comment period on the proposed plan was held between September 29 and November 29, 1997. Public notice regarding the public comment period and articles informing the public of EPA's ongoing activities at the site appeared in the Siskiyou Daily News and the Weed Press. A formal public meeting was held October 9, 1997. A transcript of the meeting can be found in the Administrative Record for this Site.

There were four written comments submitted during the public comment period, and two formal verbal comments were made during the October 9, 1997, public meeting.

6.0 SCOPE AND ROLE OF DECISION

The selected response actions in the 1990 ROD address contamination in soil, groundwater, and surface water caused by operations at the Site. The selected response actions in this ROD Amendment address contamination in soil and groundwater, with emphasis on soil and groundwater within the DNAPL Zone, caused by operations at the Site. This action revises and enhances the groundwater remedy selected in the 1990 ROD and addresses additional soil contamination found in the Roseburg excavation and Area B soils contamination discovered after issuance of the 1990 ROD. This ROD Amendment also modifies certain aspects of treated groundwater disposal and soil remedies, and addresses soils exposed by decommissioning of buildings. Table 6-1 summarizes the selected remedies for all media components at the Site.

6.1 Summary of 1990 ROD Remedy

For the Site, arsenic, carcinogenic PAHs, pentachlorophenol, and dioxins have been identified as the primary contaminants of concern. All of these contaminants are known or suspected carcinogens and all are present in each medium at concentrations exceeding health standards. Chromium, copper, zinc, benzene, and non-carcinogenic PAHs, have been identified as secondary contaminants of concern. These contaminants are considered to be less toxic than the primary COCs, are not widespread, are relatively immobile, and/or do not consistently exceed health-based standards.

The selected remedies address the documented potential threats from the Site. The 1990 ROD selected treatment of the contaminated soil and groundwater to significantly reduce the potential for future exposure to contaminated soil, groundwater, surface water, particulates, and vapor. The 1990 ROD cleanup standards for soils, sediment, and groundwater are presented in Table 4-1.

6.1.1 Ground Water Remedy

The uppermost aquifer underlying the Site is primarily impacted by arsenic, chromium, copper, zinc, carcinogenic and noncarcinogenic PAHs, PCP, and benzene. The remedy selected by the 1990 ROD for groundwater is extraction, biological treatment, chemical treatment, and discharge. Treatment and discharge standards are the same and are listed in Table 4-1. The 1990 ROD provides that groundwater be treated to meet the cleanup standard prior to reuse or release from the Site. Under the 1990 ROD, the primary disposal method for treated water was use on the Roseburg log deck sprinkler system. Other disposal options for treated groundwater included reinjection to groundwater, use by industrial processes, use for irrigation, release to subsurface drains or trenches, and disposal to percolation/evaporation ponds. In the 1990 ROD, EPA specifically did not include direct discharge to Beaughton Creek as a disposal option.

6.1.2 Soils Remedy

The 1990 ROD divided contaminated soils into three categories based on the types of chemicals present in the soils. The remedy selected for soils is specific to each area and the type of contamination present. The remedy addresses the following contaminants:

Component 1:

Component 1 soils contain only inorganic constituents exceeding the standards specified in the 1990 ROD. Inorganic contaminants at the Site are arsenic, chromium, copper, and zinc. The remedy selected by the 1990 ROD for Component 1 soils is excavation, treatment through fixation, and disposal. Excavation and treatment standards for inorganic contaminants in the surface and subsurface are listed in Table 4-1. The 1990 ROD provides that treated soils meeting the treatment standards may be placed back onto the Site in accordance with CCR Title 22 requirements. The 1990 ROD and UAO-SOW require that soils that do not meet the treatment standards are to be disposed in lined disposal cells sited and constructed according to RCRA and CCR Title 23, Chapter 15 standards (i.e., RCRA-equivalent disposal cells).

Component 2:

Component 2 soils contain only organic contaminants, primarily polycyclic aromatic hydrocarbons (PAHs), and also PCP and dioxins/furans in concentrations exceeding the 1990 ROD standards. The 1990 ROD remedy for Component 2 soils provides for excavation of impacted soils to the point where the ground water table prevents effective removal. Excavation of soils is expected to occur when ground water is at or near its lowest levels. The 1990 ROD anticipates that organic contaminants below the water table will be removed by the ground water extraction portion of the remedy. Excavated Component 2 soils are to be bioremediated in lined treatment cells. Excavation and treatment standards for organic contaminants in the surface and subsurface are included in Table 4-1. After treatment, the treatment cells are to be closed. Siting and construction of the onsite treatment and disposal cells (RCRA equivalent disposal cell) are to be in accordance with RCRA and CCR Title 23, Chapter 15 standards.

Component 3:

Component 3 soils contain both organic and inorganic contaminants exceeding the 1990 ROD standards. The 1990 ROD remedy for Component 3 soils, as with that for Component 2 soils, provides for excavation of impacted soils to the point where the ground water table prevents effective removal. According to the 1990 ROD, treatment of Component 3 soils would be accomplished in two stages: (1) bioremediation to reduce organic concentrations to 1990 ROD treatment standards, and (2) fixation to reduce inorganic concentrations to 1990 ROD treatment standards. The treated soils would be disposed of in onsite cells sited and constructed in accordance with RCRA and CCR Title 23, Chapter 15 standards.

6.2 ROD Amendment

This ROD Amendment provides a revised remedy for groundwater and subsurface soils within the DNAPL Zone, several modifications to other aspects of the soils remedy, a revision to the Beaughton Creek discharge option, and a revision to the remedy for sediments. The soils remedies selected by the 1990 ROD still pertain to subsurface soils outside the DNAPL Zone and surface soils both within and outside the DNAPL Zone.

In 1997, EPA issued the FFS (Bechtel 1997) which was developed to reevaluate the remedial action alternatives for DNAPL-impacted subsurface soils and ground water at the Site. In addition to the significant increase in the understanding of the volume and extent of DNAPLs in the subsurface, EPA's understanding of the technical issues for remediation of DNAPL-contaminated sites has continued to evolve since the FS (SAIC 1990) was completed. The purpose of the FFS was to reevaluate the 1990 FS remedial action alternatives and consider additional remedial action alternatives for subsurface soils and ground water within the area impacted by DNAPLs, taking into consideration:

- The additional Site characterization data obtained since the 1990 FS,
- Technology advances that have occurred since the 1990 FS which may affect

selection of an alternative, and

- Increased understanding of the technology issues associated with DNAPL remediation based on experience at other sites.

The FFS screened nine alternatives for their ability to clean up groundwater within the DNAPL Zone to 1990 ROD standards. The alternatives evaluated represented a broad range of technologies and costs. The alternatives were evaluated with respect to their:

- Effectiveness at removing enough of the DNAPLs so that groundwater would not continue to become contaminated over time,

- Implement ability, and

- Cost.

None of the alternatives were found certain to be effective and implementable. Therefore, EPA concluded that it is not possible to achieve the 1990 ROD cleanup standards for groundwater within the DNAPL Zone. For this reason, this area of the Site is also referred to as the Technical Impracticability (TI) zone for groundwater cleanup.

Additional modifications addressed in this ROD Amendment include:

- Addition of the option of direct discharge to Beaughton Creek for treated water based on NCRWQCB regulatory actions to require treatment of water to best practicable methods.

- Covering surface soils containing inorganic concentrations above background and below the 1990 ROD subsurface soil excavation standard with a protective asphaltic concrete surface, rather than excavating and reburying the soils on-site at a depth greater than two feet.

- Modifying the 1990 ROD treatment standard for soils to be placed in a RCRA-equivalent disposal cells by modifying the leachate test procedure.

- Broadening the implementation options for biotreatment of soils contaminated with organics to allow treatment in place (in situ), with appropriate monitoring and controls, followed by excavation and disposal in a RCRA-equivalent disposal cell.

- Evaluation of in situ bioventing as the treatment technology for Area B soils and covering these soils with two feet of clean fill.

- Designation of three features of the remedy as RCRA Corrective Action Management Units (CAMUs): The RCRA-equivalent disposal cell, the soil staging and fixation area, and the slurry wall construction zone.

- Covering the open excavation on the Roseburg property with a minimum of two feet of clean soil.

- Modification of the 1990 ROD subsurface soil excavation standards for organics-contaminated soils outside the DNAPL Zone to ensure that they remain protective of groundwater.

- Modification of the requirements for excavation, treatment, and disposal of contaminated sediments within drainage ditches discharging Site runoff into Beaughton Creek to permit natural flushing and attenuation.

- Collection and treatment of liquids from DNAPL seeps in the Roseburg excavation.

- Implementing institutional controls to prevent exposure to waste left in the DNAPL Zone and to protect the integrity of the remedy.

- Requiring the development of a soils handling plan to address instances where building decommissioning/construction activities, routine maintenance, or other ground intrusive activities on site may occur.

Sections 7 and 8 of the ROD Amendment analyze the cleanup alternatives for the DNAPL Zone. Section 8 explains the modifications to the remedy related to the DNAPL Zone and discusses the additional modifications to the remedy for soils, sediment, and discharge to Beaughton Creek.

7.0 DESCRIPTION OF ALTERNATIVES FOR THE DNAPL ZONE

EPA identified and evaluated three cleanup alternatives for the DNAPL Zone, also known as the TI Zone. All of the alternatives incorporate containment rather than clean up of groundwater within the DNAPL Zone due to the technical impracticability of remediating groundwater where DNAPLs are present in the saturated zone. The following cleanup alternatives were evaluated in detail. The remedial alternatives considered for detailed evaluation are Alternatives 1, 2, and 3, which were retained in the preliminary screening, conducted in the FFS:

Alternative 1 - No Further Action. The No Further Action alternative, which incorporates slurry wall containment of the DNAPL-contaminated subsurface soils in the DNAPL Zone, is retained throughout this analysis as the baseline case. The slurry wall was added as a component of the remedial design to enhance the restoration of groundwater outside of the DNAPL Zone. The remedy, without a slurry wall, will not be protective of human health and the environment.

Alternative 2 - Excavation to Ground Water Table after Slurry Wall Dewatering, Ex-Situ Biotreatment, Stabilization, and On-site Disposal of Treated Soils. This alternative is retained because it originates from the 1990 ROD remedy for subsurface soils and provides additional exposure control, which. is part of the revised Remedial Action Objectives (RAOs) for subsurface soils.

Alternative 3 - Additional Containment and Institutional Controls. This alternative incorporates several protective measures into the No Further Action alternative through additional containment measures and institutional controls. Alternative 3 did not meet the 1990 ROD RAOs, but was retained, consistent with EPA's feasibility study guidance, since it provides a further degree of protectiveness over the No Further Action alternative at a relatively low increment in cost.

7.1 Alternative 1 - No Further Action

The FFS and this ROD Amendment assume a baseline remedy for groundwater and soils cleanup other than groundwater and subsurface soils within the DNAPL Zone in accordance with the 1990 ROD. The baseline remedy provides that the groundwater outside of the DNAPL Zone will still be restored by pumping and treatment, to the standards selected by the 1990 ROD (See Table 4-1). This aspect of the remedy will be enhanced by constructing a slurry wall around the DNAPL Zone. A slurry wall is a physical barrier that would prevent the flow of groundwater through the DNAPL area, thereby preventing further contamination and facilitating faster cleanup of the groundwater outside of the DNAPL Zone.

Because this baseline is now part of a containment strategy, it is important to reduce the mobility of the DNAPLs that will not be excavated. Any pooling of DNAPL due to dewatering within the slurry wall would be detected and removed in order to reduce saturation and mobility. Other aspects of the slurry wall installation include: extraction of some groundwater within the DNAPL Zone to maintain an inward gradient; treatment and disposal of extracted groundwater, preferably by reuse on Roseburg's log decks; and a monitoring system to detect any leakage across the slurry wall, or down through the naturally occurring aquitard. Construction of a slurry wall is a proven, effective method of achieving containment

7.2 Alternative, 2 - Excavation to Ground Water Table After Slurry Wall Dewatering, Ex-Situ Biotreatment, Stabilization, and On-site Disposal of Treated Soils

This alternative incorporates additional measures beyond the baseline remedy (Alternative 1). Construction of the slurry wall and implementation of the inward hydraulic gradient are expected to result in some dewatering within the DNAPL Zone. Affected subsurface soils would then be excavated to a depth at which the groundwater prevents effective removal. Based on the estimated volume of soil containing DNAPLs, the minimum volume to be excavated is estimated to be more than 100,000 cubic yards. This volume could increase significantly depending on the amount of additional soil that is contaminated but does not contain DNAPLs.

Excavated soils would be biotreated to clean up organic contamination, stabilized using fixation for inorganic contamination, and disposed in lined cells on site. As stated in the 1990 ROD, all treated soil would either remain in the treatment cells or would be disposed of in accordance with RCRA Part 264 and 23 CCR Chapter 15 standards. The cells used for final disposal will be built in accordance with RCRA Part 264 and 23 CCR Chapter 15 standards. Disposal in accordance with the RCRA requirements would also require installation of monitoring wells in the upper and lower aquifers, closure, capping and long-term monitoring of the biocells.

7.3 Alternative 3 - Additional Containment and Institutional Controls

Under this alternative, additional containment measures would be undertaken after implementation of the baseline remedy (Alternative 1). This alternative was described and evaluated in the preliminary screening performed in the FFS, and was retained, consistent with EPA's feasibility study guidance, since it provides a further degree of protectiveness over the No Further Action case at a relatively low increment in cost. This alternative includes additional containment of contaminated soils at the Roseburg Excavation (not included in the 1990 FS and ROD) and institutional controls for wastes left in the DNAPL Zone.

Additional Containment of Contaminated Soils. The Roseburg Excavation is an open excavation on the Roseburg property that covers approximately 6.5 acres. The deepest point in the excavation is estimated to be 14 ft bgs based on the information provided in the Technical Memorandum, Proposed Interim Remedial Measures, Roseburg Excavation Area, J.H. Baxter Superfund Site (Environmental Solutions 1996b). The Roseburg Excavation acts as a collection point for contaminated surface runoff and increases surface water infiltration into the subsurface. As an additional containment measure beyond the baseline case, this component of Alternative 3 would include regrading the Roseburg Excavation to improve surface drainage and reduce infiltration, and placing a minimum of 2 feet of protective soil cover over the area. The soil cover would reduce the contact of surface runoff with contaminated soils within the Roseburg Excavation area, and reduce the potential for worker exposure to contaminated soils. In addition, liquids from DNAPL within the excavation would be collected and treated.

Institutional Controls for the DNAPL Zone within the Slurry Wall. Because this alternative leaves waste in place, institutional controls would be implemented to prevent exposure to wastes left in the DNAPL Zone. These controls are also necessary to protect the integrity of the remedy, including the cap and the slurry wall. These controls would include:

a. limiting future land uses to appropriate industrial uses (and prohibiting other uses);

b. restricting access to and use of contaminated groundwater;

c. prohibiting activities that would disturb the integrity of the remedy, including appropriate prohibitions on activities that would disturb the soil and/or any cap placed upon such soil;

d. requiring appropriate handling of excavated materials;

e. providing for appropriate notice (in land records and otherwise) that hazardous wastes remain on site; and

f. prohibiting other activities that could cause a potential threat to human health or the environment.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

An evaluation and comparison of the alternatives for the DNAPL Zone is presented in this

Section. For each of the other modifications to the remedies selected in the 1990 ROD. a brief summary and a table of the NCP criteria analyses is presented.

8.1 Comparative NCP Criteria Analyses of Alternatives for the DNAPL Zone

In this section, the three remedial alternatives for the DNAPL Zone are evaluated in relation to one another for each of the nine evaluation criteria. As described in Section 7, the three alternatives retained in the preliminary screening conducted in the FFS are:

Alternative 1 - No Further Action (Baseline including 1990 ROD Remedy and Slurry Wall)

Alternative 2 - Excavation to Ground Water Table after Slurry Wall Dewatering, Ex-Situ Biotreatment, Stabilization, and On-site Disposal of Treated Soil

Alternative 3 - Additional Containment and Institutional Controls

The comparison of alternatives is based on the nine key criteria required under the NCP and CERCLA Section 121 for use in evaluation of remedial alternatives by EPA. The nine criteria are as follows:

1. Overall protection of human health and the environment

2. Compliance with Applicable or Relevant and Appropriate Requirements

3. Long-term effectiveness and permanence

4. Reduction of toxicity, mobility and volume through treatment

5. Short-term effectiveness

6. Implement ability

7. Cost

8. State acceptance

9. Community acceptance

Table 8-1 presents a summary of the comparative analysis.

8.1.1 Overall Protection of Human Health and the Environment

Both Alternatives 2 and 3 have a higher degree of overall protectiveness than Alternative 1. Alternative 1 achieves only containment of the DNAPL Zone within the Target Area but does not achieve exposure control, and is, therefore, the least protective of the three alternatives. When Alternatives 2 and 3 are compared, Alternative 2 appears to have a somewhat higher degree of protectiveness over Alternative 3 due to the removal and treatment of significant quantities of impacted soils. Long term permanence is also greater, again due to the removal and treatment actions. However, overall protectiveness of Alternative 2 in comparison to Alternative 3 is countered by the fact that subsurface soils, although contaminated, do not pose an immediate risk. These soils are not currently exposed. Additionally, the short-term risks to human health and the environment posed during implementation of Alternative 2 are greater than those under Alternative 3. Assuming that institutional controls are put in place, Alternative 3 would achieve the proposed revised RAOs. This alternative protects human health and the environment by containing the DNAPL Zone within the Target Area and by reducing the potential risks of ingestion of contaminated ground water and contact with contaminated subsurface soils through the use of institutional controls.

For all three alternatives, the overall risk of further migration of DNAPL from the upper aquifer is reduced by slurry wall containment of the DNAPL Zone and by implementation of the associated hydraulic control measures as proposed in the Groundwater RDR (TRC 1996b). The slurry wall is intended to minimize the risk of further horizontal migration of DNAPL contaminants beyond the DNAPL Zone. Based on available data, the aquitard layer (OCA) underneath the Site is assumed to provide effective vertical containment of the DNAPL in the DNAPL Zone, and vertical DNAPL migration due to dewatering during implementation of the slurry wall containment will be monitored and controlled. The ground water remedial design, when finalized, will include a monitoring program for the upper and lower aquifers which is intended to verify the effectiveness of the OCA as an aquitard and the proposed slurry wall as a containment remedy. The design will also include contingency plans to take corrective actions should monitoring data indicate a need for these actions.

Without further controls to minimize access to ground water within the proposed slurry wall area, Alternative 1 would not reduce the potential risk of exposure to contaminants through ingestion of the ground water underlying the Site. Nor does Alternative 1 include any protective measures to reduce the potential for exposure to contaminants present in the shallow subsurface soils. Although there is no existing pathway at present, without removal under Alternative 2 or institutional controls under Alternative 3, exposure to contaminants in the shallow subsurface soils is plausible under a trespassing and/or excavation scenario.

Alternative 2 would minimize the potential for exposure of future industrial workers (or to other potential receptors such as trespassers, children, etc.) to contaminants in the subsurface soils by removing a significant portion of the contaminated subsurface soils. However, based on available site characterization data, it is estimated that even with soil excavation, up to 40 percent of the estimated DNAPL-impacted subsurface soils would be remaining under the anticipated ground water table after slurry wall dewatering is implemented. Therefore, removal of most of the source material mass in the vadose zone is not expected to reduce DNAPL to the amount required to restore the upper aquifer to the 1990 ROD cleanup standards within the proposed slurry wall area. Alternative 2, therefore, would need to be supplemented with institutional controls prohibiting well drilling within the DNAPL Zone in order to minimize the risk of ingestion of contaminated ground water.

Alternative 3 includes regrading and placement of a protective soil cover for the Roseburg Excavation. This area is currently acting as a collection point for contaminated surface water runoff that leaches into the subsurface. Regrading and placing a protective soil cover over the Roseburg Excavation would reduce the potential for surface water contamination due to contact with contaminated soils, and reduce infiltration by eliminating surface water pooling. The potential for worker exposure to contaminants of concern would also be reduced by placement of the protective cover over the area.

8.1.2 Compliance With AGARS

Adoption of any of the three alternatives would require a waiver of the ground water cleanup standards set forth in the 1990 ROD based on the technical impracticability (TI) from an engineering perspective for ground water restoration within the DNAPL Zone. On this basis the DNAPL Zone is also referred to as the TI Zone. EPA has waived these AGARS on the basis of technical impracticability in accordance with CERCLA section 121(d)(4)(c), 42 U.S.C. section 9621 (d)(4)(c). The three alternatives do not modify the other elements of the remedy selected in the 1990 ROD. Consequently, the three alternatives comply with the AGARS set forth in the 1990 ROD (Tables 8-2 and 8-3). However, Section 8.3 of the ROD Amendment discusses additional modification to the remedy, and the AGARS implications of these additional modifications are discussed in Section 10.2.

The AGARS specific to the slurry wall are included in Table 8-4. Because the area within the slurry wall containment system is not a "waste management unit," the substantive requirements of the sections of Chapter 15 cited in Table 8-4 are "relevant and appropriate" to the implementation of the proposed slurry wall containment system. The requirements cited in Table 8-4 would apply to ensure that the slurry wall containment system effectively precludes the constituents of concern from reaching the lower aquifer, which has been designated for municipal and domestic water supply.

8.1.3 Long-Term Effectiveness and Permanence

In addition to the baseline slurry wall containment of DNAPL within the TI Zone, Alternative 2 provides the highest long-term effectiveness and permanence of the three alternatives, since a significant portion of the impacted soils would be removed, treated, placed in a RCRA-equivalent disposal cell, and be subject to long-term monitoring. Alternative 3 has the next highest long-term effectiveness and permanence since the Roseburg Excavation would be covered, minimizing this source for surface runoff contamination and subsurface leaching. Alternative 1 would be least effective in the long-term.

The inclusion of the slurry wall, hydraulic controls, and a ground water monitoring program as the baseline for all three alternatives provides reliable containment assuming continual maintenance of the wall and mechanical systems. The long-term reliability of the slurry wall containment depends on continued ground water monitoring to evaluate and upgrade its effectiveness, on continued slurry wall maintenance, and on implementing contingency measures when required. The objective is containment of the DNAPL within the DNAPL Zone. Literature indicates that, when built properly, slurry wall systems can be effective containment measures for the long term (Rumer, R. R. and Ryan M. E., Barrier Containment Technologies for Environmental Remediation Applications, 1995).

A major factor affecting the long-term effectiveness and permanence of the proposed slurry wall is the wall's integrity and overall performance as a low permeability barrier. For example, defects during its construction could cause localized areas of higher permeability. Construction quality assurance/quality control (QA/QC) measures are, therefore, particularly important during implementation of this remedial action. Potential long-term changes in the permeability of the slurry wall could also result from (1) wetting and drying of the section of the wall which is exposed to the fluctuating ground water table, (2) desiccation of the backfill, (3) freezing and thawing cycles, and (4) chemical incompatibility.

Wetting and drying and/or desiccation are not concerns for the proposed design because a hydraulic gradient (inward) would always be maintained across the slurry wall. Also the proposed gravel drainage trench would prevent an extreme rise in the ground water table outside the southern boundary of the slurry wall. Freezing and thawing is not a concern because the freezing depth does not extend beyond the slurry wall cap depth for the anticipated climatic conditions at the Site. Chemical incompatibility of the slurry wall backfill mix with the hazardous substances, pollutants or contaminants that are being contained could also potentially cause an increase in the permeability of the slurry wall over the long term. The literature indicates that highly concentrated organic compounds can result in increased hydraulic conductivity within the slurry wall (Rumer, R. R. and Riley, M. E., 1995). However, the alignment of the proposed slurry wall has been designed such that the slurry wall bypasses the high concentration DNAPL areas. Therefore, chemical compatibility is not anticipated to be a problem provided that proper construction QA/QC procedures are implemented to prevent entrainment of DNAPL in the slurry wall backfill if DNAPL should be encountered.

Effectiveness of the slurry wall containment system also depends on implementation of hydraulic control measures. The effectiveness of the hydraulic control measures will be assessed through the monitoring programs. If needed, corrective action will be taken according to the contingency plans outlined in Section 9.2. The contingency plans also include the repair and replacement actions that may be implemented based on the monitoring data.

For Alternative 2, the excavation, treatment, and on-site disposal of treated subsurface soils ensures a permanent remedy for that portion of area soils that are treated to 1990 ROD treatment standards. However, the on-site RCRA disposal cell would also require long-term maintenance, monitoring, and corrective action if necessary. Significant quantities of impacted subsurface soils, however, would still remain in the DNAPL Zone under this alternative, both in the saturated zone (35 to 45 ft bgs) and under existing buildings.

For Alternative 3, regrading and placement of a protective cover at the Roseburg Excavation would prevent further contact of surface water with contaminated soils currently in the open excavation area. However, since hazardous wastes would be left in place, this remedy would not be considered permanent. Therefore, controls designed to avoid the likelihood of failure over the course of time would need to be adopted.

With respect to the risks remaining at the Site after the required remediation has been performed, only Alternative 3 provides controls to prevent the exposure to contaminants through ingestion of the impacted ground water and to minimize the potential pathway for exposure to contaminants left in the subsurface soils. The ability to ensure effective controls over the long term is dependent on several factors, including the compliance of the landowners with institutional controls.

8.1.4 Reduction of Toxicity, Mobility, or Volume through Treatment

The highest reduction in toxicity, mobility, and volume of contaminants is achieved through treatment and disposal under Alternative 2, since a significant portion of the impacted subsurface soils would be excavated, treated, and disposed of in a RCRA-equivalent cell. Alternative 3 would have the second highest reduction in mobility since the Roseburg Excavation would be covered with clean soil, followed by Alternative 1, which would only reduce the mobility of DNAPL and aqueous phase contaminants within the TI Zone by use of slurry wall containment system. The slurry wall containment system is also included under Alternatives 2 and 3.

Under Alternatives 1 and 3, toxicity of the contaminants in the subsurface soils within the DNAPL Zone would not be reduced. The toxicity of the contaminants of concern in ground water within the DNAPL Zone would gradually decrease due to the flushing effect of the proposed extraction system. However, this would happen over a long period of time and toxicity reduction will probably be negligible. Mobility of the contaminants of concern from both soil and ground water within the DNAPL Zone would be reduced since the slurry wall would act as a physical barrier to further migration of the contaminants of concern beyond the DNAPL Zone.

The volume of the impacted subsurface soils would not be changed under Alternatives 1 and 3. However, the proposed slurry wall would provide an upgradient barrier to ground water flowing into this area, and would prevent additional ground water from being impacted. Consequently, dewatering of the DNAPL Zone combined with the above-ground treatment of the extracted ground water would reduce to some extent the volume of contaminated ground water.

Alternative 2 reduces the mobility of DNAPL contaminants by slurry wall containment within the DNAPL Zone, and reduces both the volume and toxicity of a substantial portion of subsurface soil contamination through removal and treatment. Total soil volume to be treated is estimated to be 107,600 cubic yards (in-place), based on the minimum impacted soil estimate, and 719,000 cubic yards (in-place), based on the maximum impacted soil estimate. Under this alternative, it is believed that up to 40 percent of the DNAPL-impacted subsurface soils that are currently in the saturated zone would potentially remain under the anticipated ground water table after slurry wall dewatering is implemented. Additionally, it is assumed that the soils underneath the buildings would not be excavated. Based on these assumptions, approximately 64,000 cubic yards of contaminated soil would be left in place, based on the minimum impacted soil volume estimate, and approximately 565,000 cubic yards, based on the maximum impacted soil volume estimate.

With respect to subsurface soils to be excavated and treated under Alternative 2, the treatment process for organic contaminants, biodegradation, provides a permanent reduction in toxicity and volume. However, the treatment method for remaining inorganic contaminants, immobilization through stabilization, does not destroy the contaminants and thus may be partially reversible should the stabilized soil break down over time. Placement of treated soil into an on-site RCRA-equivalent disposal cell would further reduce the possibility of future impacts from treated soil left on-site.

Under Alternative 3, the potential for contamination of surface water is reduced through regrading and placement of the protective soil cover over the Roseburg Excavation. This would reduce the mobility of PAHs since infiltration of surface water runoff would be reduced.

8.1.5 Short-Term Effectiveness

Alternative 1 has the highest short-term effectiveness since the risks posed to the community or site workers during implementation are the least under this alternative. Alternative 3 has the next highest short-term effectiveness, since some short-term risks exist in connection with the transportation of soil to the Site and with the regrading and covering of the Roseburg Excavation. No short-term risks are involved in the implementation of the proposed institutional controls. Alternative 2 has the lowest short-term effectiveness because of the volume of soil and the complexity of the soil handling, storage, treatment, and disposal steps that would be involved in the implementation of this remedy.

Under all three alternatives, there could potentially be some short-term risk to construction workers from fugitive dust emitted during the excavation of soils for construction of the slurry wall. Also, for Alternative 3, there is potential for worker exposure to contaminants during regrading and placement of the protective soil cover on the Roseburg Excavation area due to contaminated fugitive dust. Therefore, effective dust control measures would be necessary during remediation activities. Workers would need to be equipped with appropriate personal protective equipment (PPE) during excavation through potentially contaminated subsurface soils. Soil sampling would be implemented during excavation to identify the impacted soils, and the impacted soils would be removed and disposed of appropriately. These same measures would be applied during treatment and disposal of contaminated subsurface soils to enhance the short-term protectiveness of Alternative 2.

During slurry wall excavation activities, if free-phase DNAPL is encountered, this could also result in worker exposure to concentrated hazardous substances, and potentially in uncontrolled DNAPL migration. However, this is not anticipated based on available site characterization data. If the OCA is penetrated during slurry wall excavation, adverse environmental impacts could occur due to the potential risk of further migration of the DNAPL. Excavation for the slurry wall must be conducted with great caution in order not to penetrate the OCA, especially in areas where the OCA layer is known to be less than 5 ft thick.

The short-term effects of Alternative 2 on human health and the environment are of the type that are controllable through standard health and safety precautions and good construction practices. For Alternative 3, transportation of between 12,000 and 33,400 cubic yards of clean imported soil to the Site for the soil cover placement operation would pose a short-term safety issue since there would be an increased potential for vehicular accidents due to increased truck traffic.

The time to physically implement Alternative 1 and achieve protection through source control is estimated to be approximately 1 year based on the implementation schedule provided in the Groundwater RDR (TRC 1996b). The time required to achieve protection through implementation of Alternative 2 is estimated at from 3 to 5 years for the minimum soils volume estimated and 5 to 7 tears for the maximum soil volume estimate. A minimum of 1 year is estimated for development, submittal and approval of remedial design and remedial action plans and specifications. Alternative 3, including the soil cover placement operation, could be achieved within 1 to 2 years.

8.1.6 Implement ability

The effectiveness of institutional controls will depend on the compliance of current and future landowners. In other respects, Alternative 3 is highly implementable. Since the proposed slurry wall containment system is relatively easy to implement, it will meet the proposed revised RAOs for the Target Area, and it has a low impact on the community and on operations at the Baxter plant. Alternative 1 is also easy to implement but it would not meet the proposed revised RAOs for exposure control. Alternative 2, which is based on the ROD remedy, is least implementable because of the excessive soil volumes that would need to be excavated, treated, and disposed of in an RCRA-equivalent cell, and because of the significant impact these operations would have on the community and Baxter plant operations.

For all three alternatives, the proposed slurry wall, which would be constructed to an average depth of 45 ft. is technically feasible; slurry walls have been used extensively as containment measures. The expertise, services, equipment, and material needed are available. Construction of a slurry wall around the DNAPL Zone with the proposed alignment does not interfere with other remedial alternatives, should other remedial actions be implemented in the future. It might, however, require temporary relocation of some of the subsurface utility lines. Also, the presence of the slurry wall enhances the potential for remediation or restoration of the aquifer outside the DNAPL Zone. Long-term monitoring as planned would provide the basis for the assessment of the effectiveness of the containment measure implemented. Based on monitoring results, the monitoring well network and/or the plan could be expanded, if required.

Several factors need to be considered during implementation of the slurry wall. Defects during construction of the slurry wall could lead to high permeability areas in the slurry wall. Defects could potentially be caused by use of nonhomogeneous backfill resulting from improper mixing. If improperly mixed, the backfill material could include lumps of unmixed soil or pockets of free slurry not fully blended with soil. Also, if the trench is allowed to remain open for too long, sediment could accumulate and become trapped beneath the backfill. Cave-in of the trench sides could also occur. These potential problems would be mitigated by proper construction QA/QC measures.

For Alternative 2 and Alternative 3, technology, equipment, and services for the excavation and treatment processes and for regrading and placement of the soil cover, respectively, are also readily available, and relatively easily implemented. However, the large quantities of imported soil that would be needed for backfilling the excavated areas may not be readily available from a nearby source. For Alternative 2 and Alternative 3, transportation of the imported soil may impact the implement ability of these remedies. Alternative 3 would require that from 600 to 1,670 truck loads (assuming 20 cubic yards trailer trucks). This could have a significant impact on both the cost and practical implement ability of these alternatives.

For Alternative 2, extensive land areas required for soil treatment by landfarming may pose a problem, in addition to the land area needed for the on-site RCRA disposal cell(s). The reliability of excavation, in removing the contaminants of concern would depend on the accuracy of delineation of the extent of contamination in subsurface soils. Landfarming has been shown to be reliable in reducing the levels of PAH and PCP soil constituents to between 50 percent and 100 percent. Stabilization has been demonstrated to be completely effective in reducing leachability of inorganic constituents to nondetectable levels. Monitoring of the effectiveness of the bioremediation and stabilization processes will be accomplished through in-process and confirmation sampling and analysis.

Implementation of other remedial actions simultaneously would be seriously limited during execution of Alternative 2 in the DNAPL Zone. Excavation and landfarming of up to 900,000 cubic yards of soil would consume space and equipment resources at the Site throughout the duration of field activities. Implementation of Alternative 2 might also interfere with commercial operations at the Site, which could potentially cause an adverse economic impact on the community.

The implement ability of Alternative 3's institutional controls is dependent on the compliance of
the affected landowners and the ability of each level of government (federal, state, and local) to use their respective authorities to impose and enforce institutional controls. Material and services for fencing and other access restrictions, if required, would be readily available.

8.1.7 Cost

All alternatives assume as baseline the cost of the proposed slurry wall containment and hydraulic control system. When the alternatives are compared on the basis of cost effectiveness above the baseline, Alternative 3 is rated the most cost effective. The cost of Alternative 2 is very high. The cost of Alternative 1 is the baseline cost only. A cost comparison summary is presented in Table 8-5.

No incremental costs above the baseline cost are included under Alternative 1, since this alternative includes No Further Action beyond the baseline. The cost of implementing the slurry wall containment, associated hydraulic controls, planned modifications to the ground water treatment plants, ground water monitoring wells, and the 30-year present worth of operations, maintenance, and monitoring costs are estimated to be approximately $10.9 million based on the Groundwater RDR (TRC 1996b).

The incremental cost of Alternative 2 above the baseline (i.e., excluding installation of the slurry wall, hydraulic control and ground water monitoring) is estimated to be between $26,000,000 for the minimum impacted soil volume estimate, and $160,000,000 for the maximum impacted soil volume estimate. Major components of the capital cost estimate are inclusive of site preparation; soil excavation/backfill activities; soil screening; construction of biocells and a RCRA disposal cell; ex-situ biotreatment by landfarming; soil stabilization by fixation of inorganic contaminants; leachate collection/treatment; project sampling and analysis; monitoring well installation and operation; capping and closure. The annual operating and maintenance (O&M) cost of this alternative includes cap maintenance, RCRA ground water monitoring wells (quarterly sampling program) and a 5-year review. Annual O&M cost for the minimum volume is estimated to be $46,000, and that for the maximum volume is estimated at $102,000. Annual O&M costs do not include 5-year review costs, which are estimated at $30,000 per review, and are included in the 30-year Present Worth Analysis. Total incremental cost is presented as capital cost plus present worth of O&M costs.

The incremental capital cost of Alternative 3 above the No Further Action alternative is estimated to be approximately $1,000,000. The major components of the capital cost are the costs of imported soil, equipment, and labor for regrading and placement of protective soil cover over the Roseburg Excavation area. Costs for fencing, gates, and administrative expenses for deed restrictions arc also included. The annual O&M costs include the maintenance of the fences. The O&M cost of this alternative is therefore minimal, and is estimated to be $8,000 per year for the maintenance activities, and $30,000 every 5 years for the required 5-year review. The total cost of this alternative based on a 30-year present worth of the O&M and review costs is estimated to be $1,300,000 using a discount rate of 5 percent.

For both Alternative 2 and Alternative 3 indirect capital costs such as engineering, procurement and construction management (EPCM) are assumed to be 15 percent of the direct capital costs. Contingency is taken as 30 percent of direct and indirect capital costs.

8.1.8 State Acceptance

Both Alternatives 2 and 3 are acceptable in concept to the State, but Alternative 3 is preferred. Alternative 1 is not acceptable to the State.

8.1.9 Community Acceptance

Alternative 3 is acceptable to the community. Alternatives 1 and 2 are not acceptable to the community.

8.2 Overall Ranking of Alternatives for the DNAPL Zone

Based on the above factors, if the institutional controls associated with Alternative 3 can be effectively implemented, Alternative 3 would be the highest ranking alternative. This alternative meets the proposed revised RAOs for exposure and source control, is protective of human health and the environment, is technically implementable within a reasonable time at a reasonable cost, and does not pose significant short-term risks. The implement ability of the institutional controls is dependent on the compliance of the affected landowners and the ability of each level of government (federal, state, and local) to use their respective authorities to impose and enforce such controls. The long-term effectiveness and reliability of this remedy in turn would depend on proper implementation of the proposed institutional controls. Alternative 2 is rated as the second highest alternative since it achieves the proposed revised RAOs for exposure control for the subsurface soils and source control for ground water, and provides a somewhat higher degree of protectiveness than Alternative 1, albeit at very high cost. Alternative 1 is the lowest ranking alternative since it does not meet the proposed revised RAOs for exposure control.

8.3 NCP criteria Analyses for Additional Remedy Modifications

This section describes and analyzes each of the additional remedy modifications. Tables 8-6 through 8-10 present a summary of the nine criteria analysis under the NCP for each of the major modifications.

8.3.1 Modification for Disposal of Treated Water

EPA is modifying the disposal options for treated water at the Baxter site to include direct discharge to Beaughton Creek, although the preferred disposal option will remain reuse on Roseburg's log decks. The 1990 ROD prohibited the direct discharge of treated ground water to Beaughton Creek. This prohibition was based on the NCRWQCB Water Quality Control Plan, which does not allow routine discharges to surface water and includes water quality objectives and receiving water limitations. Additionally, pursuant to the RWQCB discharge orders No. 93-87 and No. 93-88, the remediation system for the Site is to be operated in a manner which minimizes discharges to surface water by first considering other disposal options.

The 1990 ROD stated EPA's intent to work closely with the NCRWQCB and the PRPs to identify additional disposal options agreeable to all. As a result, the option of direct discharge to Beaughton Creek has been added to this ROD Amendment based on RWQCB regulatory action to require treatment of water to best practicable methods. The water treatment system must be operated in a manner that minimizes discharges to Beaughton Creek by preliminarily considering the use of the other disposal options allowed by the ROD, leaving discharge to Beaughton Creek as a last and least favored option.

8.3.2 Surface Soils Containing Inorganic Concentrations above Background and below the 1990 ROD Subsurface Soil Excavation Standard

This ROD Amendment modifies part of the remedy for surface soil contaminated with inorganic compounds only. The 1990 ROD requires excavation of surface soils contaminated with inorganics if the concentration of contaminants exceeds the ROD surface soil excavation standards set forth in Table 4-1. The risk-based surface soil excavation standard required the excavation of surface soils contaminated with above background levels of arsenic, or above risk levels of chromium, copper, or zinc. The surface soil excavation standard was based on background arsenic levels and reflects the potential risk of surface exposure.

Soils with contaminant concentrations below the subsurface soil excavation standard but above the surface soil excavation standard (background) were to be excavated and placed as subsurface fill with a minimum of two feet of clean surface soil cover. The 1990 ROD remedy provided for reduction of direct contact and inhalation risks for inorganic contaminants in surface soil while protecting against potential releases to groundwater. The subsurface soil excavation standard was designed to be protective of groundwater.

This ROD Amendment selects the alternative of covering surface soils above the surface soil excavation standard and below the subsurface soil excavation standard (see Table 4-2), as determined using the unmodified TCLP test, with a protective asphaltic concrete surface, rather than excavating and reburying the soils to a depth greater than two feet. This option provides for reduction of direct contact and inhalation risks, is protective of groundwater, and reduces the short-term risks related to excavation and reburial of contaminated surface soil. Figure 8-1 shows the layout of the asphaltic concrete wearing surfaces. The 1990 ROD goal of controlling surface-related exposures is accomplished more rapidly as compared to the original design schedule. Applying the asphaltic concrete surface, a wearing surface, avoids the excavation of an estimated 30,000 cubic yards of contaminated soil and the considerable quantity of airborne and other exposures that would be generated. Reducing the amount of excavated soils that must be handled will allow a better and more focused handling of the remaining high concentrations soils that must be excavated. Table 8-6 provides an NCP-criteria analysis for this remedy modification.

8.3.3 Modification of Procedure to Verify Attainment of Soils Treatment Standard

This ROD Amendment modifies the leachate test procedure that is used to confirm the attainment of treatment standards for soils to be placed in a RCRA-equivalent disposal cell. The 1990 ROD for surface and subsurface soils consists of a numerical limit (Table 4-1) as well as a specific leachate test procedure (STLC) to measure compliance. To test that soils to be placed in the RCRA-equivalent disposal cell have met the numerical limit set by the 1990 ROD, deionized water rather than a citric acid buffer will be used for the leaching solution. The benefits of using the modified leachate procedure on soils destined for the RCRA-equivalent disposal cell are that once excavated:

- A smaller volume of soils with inorganic contamination may require fixation prior to disposal, and

- A smaller volume of soils with organic contamination may require bioremediation prior to disposal.

Site soils have been shown to be neutral to mildly alkaline. These high pH values, together with the low amount of decomposable organic material in the soils, particularly compared to that found in sanitary landfills, indicate that a more site-specific test, i.e., using deionized water which is neutral, may be more representative of Site conditions.

This modification applies only to testing of soil after excavation or excavation and treatment. The standard leachate tests will still be used to measure compliance with the subsurface soil excavation standards that are expressed in terms of leachate (see Table 4-2) and to determine whether contaminated soils constitute RCRA characteristic hazardous waste. The Area B treatment standards and the new subsurface soil excavation standards for soils contaminated with organics, both of which are discussed below, are not expressed in terms of leachate.

Table 8-7 provides an NCP nine criteria analysis for this remedy modification.

This modification does not prevent the WRG from using the more stringent versions of leachate test procedures, if desired.

8.3.4 Modification of Biotreatment Implementation

The 1990 ROD requires soils contaminated with organics to be excavated and placed in lined land-treatment cells (RCRA-equivalent cells). Soils were to be treated using natural microbial populations, whose effectiveness would be enhanced through the use of nutrients and fertilizers into the soil. This Amendment broadens the implementation options for bioremediation to allow treatment in place (in situ), with appropriate monitoring and controls. All bioremediated soils (with the possible exception of Area B soils discussed below) will be excavated and placed in a RCRA-equivalent disposal cell.

Bioremediation efforts at the Site since the 1990 ROD was issued indicate that bioremediation can be controlled to minimize or eliminate leachate formation, the primary reason for the requirement that the bioremediation be done in lined cells. The bioremediation performed to date indicates that bioremediation of Site materials is at its most efficient when the moisture content is low enough to minimize or eliminate leachate formation.

Table 8-8 provides an NCP nine criteria analysis for this alternative treatment option.

8.3.5 Alternative Treatment and Disposal Options for Area B Soils

The 1990 ROD did not specifically address Area B soils. The full extent of contaminated subsurface soils was delineated during site characterizations under EPA direction in 1994-95. Area B soils are contaminated with organics and are believed to have been excavated from the DNAPL Zone and moved to their current location when Roseburg began preparations for new building construction. The Area B treatment standards are set forth in Table 4-2, and are based on the newly promulgated LDRs for F032, F034 and F035 listed hazardous waste. All soil in Area B will be covered with two feet of clean soil. EPA will evaluate in situ bioventing as the treatment technology for Area B soils. In addition, EPA and will evaluate the results of modeling and/or other studies to assess the impact of contaminated soils on groundwater in order to ensure that the cleanup levels achieved by bioventing will be protective of groundwater. If EPA concludes that the cleanup levels achieved by bioventing will be protective of groundwater, then Area B soils will remain in place after treatment has been completed. If EPA concludes that the cleanup levels achieved by bioventing will not be protective of groundwater, then the remedy will be biotreatment and subsequent disposal in a RCRA-equivalent disposal cell. Area B soils to be placed in the RCRA-equivalent cell must comply with the 1990 ROD treatment standards using the modified leachate test described above.

Table 8-9 provides an NCP nine criteria analysis for the bioventing treatment option.

8.3.6 Modified Excavation Standards for Subsurface Soils Contaminated with Organics

EPA has modified the 1990 ROD subsurface soil excavation standards for organics-contaminated soils outside the DNAPL Zone in order to ensure that they remain protective of groundwater. The new subsurface soil excavation standards are the same as the Area B treatment standards (see Table 4-2). As with Area B, EPA will evaluate the results of modeling and/or other studies to assess the impact of contaminated soils on groundwater. The new subsurface soil excavation standards will apply to all soils located outside the DNAPL Zone which are contaminated with organics (including Area B soils, if bioventing is not successful and the soils are ultimately excavated). As with Area B, EPA may re-evaluate these excavation standards based on modeling and/or other studies assessing the impact of contaminated soils on groundwater. Excavated soils to be placed in the RCRA-equivalent cell must comply with the 1990 ROD treatment standards using the modified leachate test described above.

8.3.7 RCRA-Equivalent Disposal Cell. Soil Staging and Fixation Area, and Slurry Wall

Construction Zone

8.3.7.1 Designation as CAMUs - EPA designates the RCRA-equivalent disposal cell, the slurry wall construction zone (consisting of the slurry wall trench and a temporary 60 foot mobile construction area along the trench) and the soil staging and fixation area, as Corrective Action Management Units (CAMUs) pursuant to 40 CFR º264.552, as implemented by the State of California through Title 22, section 66264.552. Accordingly, the CAMU regulation is an ARAR as discussed in Section 10.2 of this ROD Amendment. Figure 8-2 shows the approximate size and locations of the soil staging and fixation area, the RCRA-equivalent disposal cell, and the slurry wall trench. The notice requirements for the ROD Amendment satisfy the public notice requirements of the CAMU rule.

Without a CAMU, the remedy would require treatment of contaminated soils to satisfy RCRA LDRs for D004, D007, D037, F032, F034 and F035 wastes prior to placement in the RCRA-equivalent cell, the soil staging and fixation area and the slurry wall construction zone. However, placement of remediation wastes into a CAMU does not constitute land disposal of hazardous wastes and does not trigger the LDR requirements.

The remainder of this section explains how these units satisfy the CAMU requirements and sets forth the design, operation and closure requirements for each CAMU.

In designating the CAMUs, EPA has considered the criteria set forth in 22 CCR º66264.552. Table 8-10 provides a seven-criterion analysis for the CAMUs. On the basis of this analysis, EPA has determined that the CAMUs satisfy the following criteria:

- the CAMUs will facilitate the implementation of a reliable, effective, protective and cost-effective remedy;

- the management of waste at the designated CAMUs will not create unacceptable risk to human health or the environment resulting from exposure to hazardous wastes or hazardous constituents,

- wastes in the CAMUs shall be managed and contained to minimize future release, to the extent practicable;

- the CAMUs expedite the timing of remedial activity implementation, when appropriate and practicable; and

- the CAMUs, to the extent practicable, minimize the land area of the facility upon which wastes will remain in place after closure of the CAMUs.

The CAMU regulations also provide that the CAMU "shall include uncontaminated areas of the facility, only if including such areas for the purpose of managing remediation waste is more protective than management of such wastes at contaminated areas of the facility [22 CCR º66264.552(c)(3)]. Limited areas are available for locating the RCRA-equivalent cell. Therefore, the cell will be located in an uncontaminated area. However, locating the cell in an uncontaminated area is more protective than management of the waste in contaminated areas for the following reasons:

- The "bottom" of the cell (i.e., soil berms, vadose zone monitoring system, and bottom liners) can be constructed in a clean area, thereby eliminating worker exposure to soil contaminants during this phase;

- Contaminated soil will only have to be excavated, or excavated and treated, and then transported once, thereby minimizing the risks of both worker exposure during handling as well as worker and residential exposure to contaminated wind-borne dust; and

- Creation of a single disposal cell in an isolated area of the Site will reduce the possibility of damage to the cell from ongoing plant operations or future activities at the site, as well as simplifying long-term maintenance of the cell cover.

EPA also has considered the criteria in subparagraph (6) of 22 CCR º66264.552(c) and determined that the concerns expressed in such criteria are inappropriate and/or inapplicable to the Site for the reasons discussed below. The regulations in this subparagraph provide that the CAMU "shall enable the use, when appropriate, of treatment technologies (including innovative technologies) to enhance the long-term effectiveness of [remedial] actions by reducing the toxicity, mobility or volume of wastes that will remain in place after closure of the" CAMU. Untreated wastes within the slurry wall trench or the RCRA-equivalent disposal cell will be effectively and reliably contained and immobilized. Wastes will not be left in place after closure of the soil staging and fixation area or the slurry wall construction zone. Therefore, in designating these CAMUs, EPA has considered this criteria, and determined that it is not appropriate for this Site.

8.3.7.2 Design, Operation and Closure Requirements for CAMUs - In accordance with 22 CCR º66264.552(e), the following section describes the design, operation and closure requirements applicable to each CAMU:

RCRA-Equivalent Disposal Cell - The disposal cell will comply with all AGARS of RCRA and Title 23 CCR Chapter 15, including groundwater monitoring, leachate control, and closure requirements. RCRA and Title 23 CCR Chapter 15 requirements are often duplicative. The more stringent requirements of either Title 22 or Title 23 have been identified as AGARS. Table 8-11 sets forth the requirements that apply to the design, construction, operation and closure of the RCRA-equivalent cell.

Because EPA has designated the RCRA-equivalent cell as a CAMU, placement of contaminated soils into the RCRA-equivalent cell will not constitute land disposal of hazardous wastes and will not require treatment to LDR standards.

Soil Staging and Fixation Area - The soil staging and fixation area has been designated as a CAMU. The soil staging and fixation area is designed to facilitate the implementation of the remedy in two respects. First, it is designed to serve as a temporary storage area (one year) for a small volume (approximately 1500 cubic yards) of contaminated surface soils excavated to construct the slurry wall. Second, it will serve as a temporary holding area for contaminated surface soils that will be excavated and placed in the RCRA-equivalent disposal cell. Prior to placement in the RCRA-equivalent disposal cell, the excavated soils will be tested and will be fixated, if necessary, to ensure that they meet the 1990 ROD treatment standards using the modified leachate test described in this ROD Amendment.

The approximate size and location of the soil staging and fixation area is shown in Figure 8-2. The soil staging and fixation area must satisfy the substantive design, construction, operation and closure requirements set forth in Table 8-12. These requirements are intended to prevent the migration of contaminants into adjacent soils and to achieve a level of groundwater protection equivalent to the prescriptive standards of Title 23 CCR Chapter 15. The soil staging and fixation area will comply with the Chapter 15 liner, interim cover, precipitation and drainage control, and other substantive requirements specified in Table 8-12, and will be closed in accordance with the RCRA clean closure requirements set forth in 40 CFR 264.258, as implemented through 22 CCR 66264.258.

The requirements identified in Table 8-12 will achieve the level of water quality protection required by Title 23 CCR Chapter 15. The required interim cover and precipitation and drainage controls will prevent the generation of leachate by preventing rainwater from infiltrating through contaminated soil. In the unlikely event that leachate is produced, the required liner will effectively contain the leachate. Many of the Chapter 15 prescriptive standards, including the containment structure requirements in Section 2541, are designed for long-term operating facilities. Since the soil staging and fixation will be closed after approximately one year, these design features are not necessary to prevent water quality impairment. In addition to the requirements identified in Table 8-12, the groundwater monitoring plan for the site will protect water quality by detecting any increases in the levels of groundwater contaminants. Finally, after approximately one year of operation, the soil staging and fixation area will be closed in accordance with the RCRA clean closure requirements for waste piles, and all contaminated soils, structures and equipment will be excavated, disposed of, or decontaminated and the area will be covered by an asphalt cap.

In sum, the requirements identified in Table 8-12 for the soil staging and fixation area will protect groundwater quality to the same extent as the Chapter 15 prescriptive standards and will therefore comply with Section 2510(b) of Chapter 15. Because many of the Chapter 15 prescriptive standards are designed for long-term operating facilities (30 years plus), requiring these standards at a temporary facility subject to clean closure would be unreasonably and unnecessarily burdensome.

Placement of contaminated soil into the soil staging and fixation area will not constitute land disposal of hazardous wastes because EPA has designated this unit as a CAMU.

Slurry Wall Construction Zone - The slurry wall construction zone (including the slurry wall trench and the temporary construction area along the slurry wall trench) has been designated as a CAMU. The approximate size and location of the slurry wall trench is shown in Figure 8-1. The slurry wall construction zone will consist of the slurry wall trench and a sixty foot construction area that will follow the construction of the slurry wall. During slurry wall construction, excavated soils will be temporarily placed on the ground in the slurry wall construction area prior to being mixed with a slurry compound. The mixture will then be placed into the slurry wall trench to form the structure of the slurry wall.

Soils excavated for the purpose of constructing the slurry wall will be placed primarily on the TI Zone side of the slurry wall trench. Consequently, they will generally be located within the designated containment zone for contaminated media. The soil will be exposed for a very short period of time. Once excavated and mixed with the slurry compound, the soil will be returned to the trench. Mixing of the soil with the slurry compound will immobilize any contaminants that may have been in the soil. The slurry wall construction zone must be managed in accordance with 40 C.F.R. º264.14(a)-(c), as implemented through CCR º66264.14(a)-(c), requiring, inter alia, controlled access to the construction zone, 24 hour surveillance, and signs alerting unauthorized personnel to keep out. Once the soils have been mixed and returned to the slurry wall trench, all contaminated soils must be excavated from the construction area in accordance with the clean closure requirements set forth in 40 C.F.R. º264.258(a), as implemented through CCR º66264.258 (a). The majority of the soils being handled in construction of the slurry wall are either not contaminated or contain very low levels of contamination. The low levels and reduced quantities of contamination, brief exposure period, placement primarily within the TI Zone, 24 hour surveillance and other security precautions, and clean closure requirements will ensure that there is no unacceptable risk to human health and the environment.

Temporary placement of remediation wastes in the slurry wall construction zone and placement of remediation wastes into the slurry wall trench to form the structure of the slurry wall will not constitute land disposal of hazardous waste because EPA has designated the slurry wall construction zone as a CAMU. Although the slurry wall construction zone has been designated a CAMU, it will still be subject to the applicable or relevant and appropriate provisions of Chapter 15. Section 2511(d) of Chapter 15 exempts CERCLA cleanup actions from Chapter 15, provided that remedial actions intended to contain wastes at the place of release shall implement applicable provisions of Chapter 15 to the extent feasible. For the reasons explained above, EPA has concluded that requiring the slurry wall construction zone to comply with the Chapter 15 prescriptive requirements, including the liner requirements, would be unnecessarily and unreasonably burdensome, and would therefore not be feasible. Moreover, the requirements for the slurry wall construction zone will provide a level of groundwater protection equivalent to the Chapter 15 prescriptive requirements and will therefore comply with º2510 (b) of Chapter 15. AGARS for the construction of the slurry wall itself are set forth in Table 8-4. Because the slurry wall containment system is not a "waste management unit" as that term is defined in Chapter 15, Chapter 15 action specific AGARS are relevant and appropriate rather than applicable.

8.3.8 Institutional Controls

The 1990 ROD required excavation of contaminated soil, extraction of contaminated groundwater, and treatment to the standards specified in the ROD. However, this ROD Amendment provides for the containment of contaminated soils and groundwater in the DNAPL Zone. As a result, institutional controls are added to the remedy to assure protectiveness of the remedy.

The institutional controls are described in Section 7.3. The primary purpose of these controls is to prevent exposure to contaminated soils and groundwater that will remain during and after remediation.

Institutional controls will also protect the integrity of the remedy through appropriate prohibitions on activities that would disturb soil or any cap placed on soil, or activities that would breach the slurry wall or disturb the RCRA-equivalent disposal cell. One element of these controls will be a soils handling plan. The soils handling plan will be developed and approved by EPA to address instances where building decommissioning/construction activities, routine maintenance, or other ground intrusive activities on site may occur.

8.3.9 Ditch Sediments

In the 1990 ROD, the selected remedy for contaminated sediments; sediments in Beaughton Creek near the NPDES discharge point; and site drainage sediments was excavation by dredging followed by treatment and disposal. This ROD Amendment modifies requirements for contaminated sediment within drainage ditches discharging Site runoff into Beaughton Creek. Rather than excavation, treatment, and disposal, the ditch sediments will be allowed to continue to degrade naturally to a level below the 1990 ROD sediment excavation standards (see Table 4-1 and 4-2).

Post 1990 ROD sediment sampling has found only two ditch segments with constituent concentrations above the sediment excavation standards (Table 4-1). However, and more importantly, these concentrations are only slightly above excavation standard concentrations. Additionally, further comparative analysis of excavation versus natural flushing indicates more potential adverse environmental impact from disturbing the sediments during excavation than from natural flushing (TRC 1996a). Potential adverse impacts include human contact during excavation and increased releases to surface water.

Post 1990 ROD monitoring of Beaughton Creek indicates natural flushing and attenuation of contaminated sediments has occurred. This natural attenuation is expected to continue with no adverse environmental impact and is expected to result in concentrations of contaminants of concern dropping to below sediment excavation standards (TRC 1996a). Consequently this ROD Amendment selects natural attenuation as the remedy for ditch sediments, provided that the contaminants degrade naturally to a level at or below the sediment cleanup standards set forth in Table 4-2 and that the contaminated sediments are not disturbed. However, stream sediments will continue to be monitored, the areas of concern in the stream will be posted with cautionary signs, and the discharge and surface water runoff from the site will continue to be monitored in order to ensure protectiveness.

9.0 SELECTED REMEDY

The following sections, describe the modifications to the 1990 ROD, including the selected alternative for the DNAPL Zone and additional enhancements, modifications, and containment measures. Figure 8-1 shows the locations of all the remedy components for the Site. Table 4-2 sets forth the cleanup standards for the modified remedy. Table 8-4 summarizes the AGARS triggered by the modified remedy in addition to those identified in the 1990 ROD and reproduced in Tables 8-2 and 8-3.

9.1 Cleanup Standards for the DNAPL Zone

None of the alternatives evaluated by EPA in the FFS were found to be effective and implementable for the cleanup of groundwater within the DNAPL Zone to 1990 ROD standards. Therefore, EPA concluded that it is not possible to achieve the 1990 ROD cleanup standards for groundwater within the DNAPL Zone. EPA is therefore waiving the groundwater cleanup standards within the DNAPL Zone based on a determination that attainment of these standards is technically impracticable from an engineering perspective, and that the slurry wall can effectively contain the contamination left in place. Page two of Table 4-2 sets forth the groundwater cleanup standards which will be waived in the DNAPL Zone.

Within the DNAPL Zone, EPA is revising the 1990 ROD cleanup strategy for groundwater and subsurface soils to ensure that the remedy remains protective of human health and the environment. The revisions include the following elements:

- Contain groundwater and DNAPLs to prevent their migration
- Prevent ingestion of contaminated groundwater

- Prevent direct contact with contaminated subsurface soils and seeps.

The cleanup standards defined in this ROD Amendment are subject to re-evaluation with respect to effectiveness in protecting human health and the environment at the 5-year review period.

9.2 Selected Remedial Action for the DNAPL Zone

EPA's selected remedy for groundwater and subsurface soil within the DNAPL Zone is Alternative 3, Additional Containment and Institutional Controls, provided that the institutional controls can be effectively implemented. The selected remedy requires the construction of a slurry wall around the DNAPL Zone in order to enhance groundwater restoration outside the DNAPL Zone and to contain the contaminated groundwater within the DNAPL Zone. Table 8-4 sets forth the requirements for the slurry wall containment system.

An inward gradient shall be established by extracting groundwater within the slurry wall. Contaminant migration outside of and below the DNAPL Zone shall be detected by a monitoring system and shall be corrected. Monitoring data shall be carefully evaluated, and existing Site groundwater transport models on the behavior of the slurry wall and containment area shall be compared on an ongoing basis to the actual groundwater data. Other information on containment performance shall be regularly reviewed to determine if evidence exists of containment zone failure such that contaminants are migrating or suspected to be migrating from the zone. Where failure is suspected, measures shall be promptly taken to confirm containment zone failure. Once substantially confirmed, immediate corrective actions to control migration of pollutants from within the zone shall be initiated where contaminants are migrating or suspected to be migrating to groundwater areas which contain constituents of concern at levels less that present in the migrating groundwater. Additional measures shall be developed, if necessary, to address containment zone failure. The monitoring program shall require that a report of all actions be filed with EPA and the State after discovery of any suspected containment system failure or of taking any corrective action with respect to the containment system.

Pooling of DNAPLs within the zone itself shall be detected by a monitoring system and shall be extracted. The Roseburg excavation shall be re-graded to improve surface drainage and reduce infiltration and shall be covered with a minimum of two feet of clean backfill. Institutional controls shall be implemented to prevent future exposures to contaminants in the DNAPL Zone and to protect the integrity of the remedy.

These controls shall include:

a. limiting future land uses to appropriate industrial uses (and prohibiting other uses);

b. restricting access to and use of contaminated groundwater;

c. prohibiting activities that would disturb the integrity of the remedy, including appropriate prohibitions on activities that would disturb the soil and/or any cap placed upon such soil;

d. requiring appropriate handling of excavated materials;

e. providing for appropriate notice (in land records and otherwise) that hazardous wastes remain on site; and

f. prohibiting other activities that could cause a potential threat to human health or the environment.

EPA estimates that it will take an additional one to two years to implement this remedy. The selected remedy protects human health and the environment and achieves the cleanup objectives of containing contaminated groundwater in the DNAPL Zone, preventing ingestion of contaminated groundwater, and preventing direct contact with contaminated subsurface soils and seeps.

9.3 Selected Remedy Enhancements

To enhance the 1990 ROD remedy EPA has selected the following modifications to the groundwater and soils remedies as well as these additional containment measures.

Modification for Disposal of Treated Water

- Addition of the option of direct discharge to Beaughton Creek for treated water based on NCRWQCB regulatory actions to require treatment of water to best practicable methods. The preferred disposal option continues to be reuse on Roseburg's log decks as described in the 1990 ROD. Reuse on the log decks would reduce water diversions from Beaughton Creek, which is water-limited during the dry season. Treated water discharged to Beaughton Creek must meet the standards set forth in Table 4-2.

Additional Modifications to Soils Remedies

- Surface Soils Containing Inorganic Concentrations above Background and below the 1990 ROD Subsurface Soil Excavation Standard - Covering these soils with a protective asphaltic concrete surface, rather than excavating and reburying the soils on-site at a depth greater than two feet. This modification will provide equal long-term protectiveness while minimizing short-term risks associated with excavation and handling of soils. All soils outside the DNAPL Zone exceeding the subsurface soil excavation standard set forth in Table 4-2 for any contaminant (using the standard leachate test) will still be excavated. It should be noted that the surface and subsurface soil excavation standards for inorganics have not changed.

- Modification of Procedure to Verify Attainment of Soils Treatment Standard - Modifying the 1990 ROD treatment standard for soils to be placed in the lined disposal cells (equivalent to Resource Conservation and Recovery Act [RCRA] disposal cells) by modifying the leachate test procedure. The new test will use deionized water rather than a citric acid buffer for the leaching solution. The test will be used to demonstrate that soils have met the 1990 ROD numerical treatment standards for soils placed in the RCRA cell. These standards are reproduced in Table 4-2. Because testing has shown that Site soils are not acidic, deionized water, which is neutral, may be more representative of Site conditions. Additionally, as this modification will apply only to soils to be placed in the RCRA-equivalent cell, there is no increased threat to humans or groundwater

- Modification of Biotreatment Implementation - Broadening the implementation options for biotreatment to allow treatment in place (in situ), with appropriate monitoring and controls. However, all biotreated soils (with possible exception of Area B soils as explained below) will be excavated and placed in a lined RCRA-equivalent disposal cell.

- Alternative Treatment and Disposal Options for Area B Soils - Area B soils are contaminated with organics and are believed to have been excavated from the DNAPL Zone and moved to their current location when Roseburg began preparations for new building construction. EPA has selected treatment standards for Area B (see Table 4-2) based on groundwater protection concerns. In addition, Area B soils will be covered by two feet of clean soil. EPA will evaluate in situ bioventing as the treatment technology for Area B soils. EPA will also evaluate the results of modeling and/or other studies to assess the impact of contaminated soils on groundwater in order to ensure that the cleanup levels achieved by bioventing will be protective of groundwater. If EPA concludes that the cleanup levels achieved by bioventing will be protective of groundwater, then Area B soils will remain in place after treatment has been completed. If EPA concludes that the cleanup levels achieved by bioventing will not be protective of groundwater, then the remedy will be biotreatment and subsequent disposal in a RCRA-equivalent disposal cell. Area B soils to be placed in the RCRA-equivalent cell must comply with the 1990 ROD treatment standards, reproduced in Table 4-2, using the modified leachate test described above.
- Modified Excavation Standards for Subsurface Soils Contaminated with Organics - EPA has modified the 1990 ROD subsurface soil excavation standards for organics-contaminated soils outside the DNAPL Zone in order to ensure that they

remain protective of groundwater (see Table 4-2). The new subsurface soil excavation standards are the same as the Area B treatment standards and will apply to all soils located outside the DNAPL Zone which are contaminated with organics (including Area B soils, if bioventing is not successful and the soils are ultimately excavated). As with Area B, EPA and will evaluate the results of modeling and/or other studies to assess the impact of contaminated soils on groundwater. In accordance with the remedy modifications described above, subsurface soils within the DNAPL Zone will not be excavated. Excavated soils to be placed in the RCRA-equivalent cell must comply with the 1990 ROD treatment standards, reproduced in Table 4-2, using the modified leachate test described above.

- Designation of Disposal Cell and Soil Staging and Fixation Area for Soils - EPA designates three features of the remedy as RCRA Corrective Action Management Units (CAMUs): The RCRA-equivalent disposal cell, the soil staging and fixation area, and the slurry wall construction zone. These CAMUs must comply with the requirements set forth in sections 8.3.7 and 10.2 of this ROD Amendment and in Tables 8-11 and 8-12. Neither placement of remediation wastes into the RCRA-equivalent disposal cell, nor temporary placement of soils in the soil staging and fixation area and the slurry wall construction zone, nor incorporation of contaminated soils into the slurry wall trench will constitute land disposal of hazardous wastes.

Modification for Handling of Soils Uncovered during Operation and Maintenance

- Handling of Soils during Operation and Maintenance - A soils handling plan will be developed and approved by EPA to address instances where building decommissioning/construction activities, routine maintenance, or other ground intrusive activities on site may occur.

9.4 Selection of Institutional Controls

- This ROD Amendment modifies the remedy for soil and groundwater within the DNAPL Zone. Subsurface soil within the DNAPL Zone will be left in place rather than excavated. Groundwater within the DNAPL Zone will be contained rather than remediated. In order to prevent exposure to contaminated soil and groundwater, and to preserve the overall integrity of the remedy (including the cap, slurry wall and RCRA-equivalent disposal cell). The institutional controls described in Section 9.2 above shall be implemented.

9.5 Modification of Remedy for Ditch Sediments

- This ROD Amendment modifies requirements for excavation, treatment, and disposal of contaminated sediments within drainage ditches discharging Site runoff into Beaughton Creek. The ditch sediments will be allowed to continue to degrade naturally to the standards specified in Table 4-2, provided that contaminated ditch sediments are not disturbed. However, stream sediments will continue to be monitored and the areas of concern in the stream will be posted with cautionary signs to notify the public of any contamination that may have been detected. In addition, the discharge and surface water runoff from the site will continue to be monitored to ensure protectiveness.

10.0 STATUTORY DETERMINATION

10.1 Protection of Human Health and the Environment

The selected remedy protects human health and the environment through excavation, treatment or fixation, as necessary, and then containment of contaminated soil in a RCRA-equivalent disposal cell, through in situ bioventing for Area B soils, through capping of surface soils beneath an asphaltic concrete surface, by extraction and treatment of groundwater, and by containment of groundwater and subsurface soils contaminated with DNAPLs within a slurry wall. Excavation of subsurface soils, and excavation or capping of surface soils to achieve cleanup standards will ensure that residual contamination does not pose unacceptable risk to workers at the site or neighboring residents.

Deed restrictions will prevent future uses of the site (such as residential development or installation of drinking water wells) that would result in unacceptable levels of exposure to contaminated soil or groundwater. There are no short-term threats associated with the selected remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the remedy.

The primary long-term risk posed by the RCRA-equivalent disposal cell and the DNAPL Zone is direct exposure (i.e., direct contact) the contaminated material contained in these portions of the remedy. Exposure is unlikely, however, because of the cover that will be placed on the disposal cell and the asphaltic concrete surface that will placed over surface soils.

The potential for exposure due to migration of contaminants through a leaking liner in the disposal cell into groundwater that is used for water supply is exceedingly small. Furthermore, soil will be placed in the cell in a relatively dry state (i.e., very low moisture content and no free liquids). The disposal cell design, monitoring systems and maintenance requirements are expected to prevent conditions that would allow leaks.

The potential for exposure due to migration of contaminants from the DNAPL Zone into groundwater that is used for water supply is small. Contaminants will be contained laterally by the slurry wall and the hydraulic gradient induced by pumping. Contaminants will be contained vertically by the OCA, which is the confining unit separating the contaminated upper aquifer from the uncontaminated lower aquifer. In addition, protection of the lower aquifer will be assured through a groundwater monitoring program.

10.2 Compliance with AGARS

Remedial actions selected under CERCLA must comply with all Applicable or Relevant and Appropriate Requirements ("AGARS") under federal environmental law or, where more stringent than the federal requirements, state or state subdivision environmental or facility siting laws.

Where a State is delegated authority to enforce a federal statute, such as RCRA, the delegated portions of the statute are considered to be a federal ARAR unless the State law is broader or more stringent than the federal law.

AGARS are generally characterized as follows: (1) chemical-specific requirements, (2) action-specific requirements; and (3)location-specific requirements. Where no ARAR exists for a given chemical, action or location, EPA may consider non-promulgated federal or state advisories and guidances as To Be Considered criteria ("TBC"). Although consideration of a TBC is not required, if standards are selected based on TBCs, those standards are legally enforceable as if the TBC were an ARAR.

Chemical-specific AGARS are risk-based cleanup standards or methodologies which, when applied to site-specific conditions, result in the development of cleanup standards for contaminants of concern.

Location-specific AGARS are restrictions placed on concentrations of hazardous substances or the conduct of activities because of the special locations, which have important geographical, biological or cultural features. Examples of special locations include wetlands, flood plains, sensitive ecosystems and seismic areas.

Action-specific AGARS are technology-based or activity-based requirements or limitations on actions to be taken to handle hazardous wastes. They are triggered by the particular remedial activities selected to accomplish a remedy.

The AGARS adopted in the ROD are presented in Tables 8-2 and 8-3. These AGARS were "frozen" as of the date of the ROD and will only be re-opened in this ROD Amendment to the extent that (i) modifications to the remedy require a waiver of those AGARS or present new remedial activities that require the adoption of additional action specific AGARS; or (ii) newly promulgated or modified requirements are necessary to ensure the protectiveness of the selected remedy. See 40 CFR º300.430(f)(l)(ii)(B); 55 Federal Register 8747, 8757-8758 (March 8, 1990).
The ROD Amendment modifies both the groundwater remedy and the soils remedy. The AGARS implications of these modifications are discussed below and are also summarized in Table 8-4.

Waiver of Groundwater Cleanup AGARS

In this ROD Amendment, EPA concludes that it is technically impracticable from an engineering perspective to achieve the ROD cleanup standards for groundwater within the DNAPL Zone. The revised groundwater remedy provides for the construction of a slurry wall containment system (including hydraulic gradients induced by pumping) in order to contain the contaminated groundwater in the DNAPL Zone. Groundwater outside of the DNAPL Zone will be remediated to the ROD groundwater cleanup standards.

Selection of a containment remedy for groundwater within the DNAPL Zone requires the waiver of the groundwater cleanup standards set forth in the ROD on the basis of technical impracticability (TI). The factual basis for the TI waiver is set forth in the TI Evaluation Summary in the FFS.

Page 2 of Table 4-2 sets forth the groundwater AGARS selected in the ROD, which will be waived for the groundwater contained in the DNAPL Zone.

North Coast Regional Water Quality Control Board (NCRWQCB) Action Specific AGARS for the Slurry Wall Containment System

Although EPA has regarded the slurry wall as a necessary design element for groundwater restoration outside of the DNAPL Zone, it was not an explicit element of the remedial action selected in the ROD. Therefore, action-specific AGARS for the slurry wall have been identified in Table 8-4.

The slurry wall containment system is designed to protect the lower aquifer. The requirements cited in Table 8-4 apply to ensure that the slurry wall containment system effectively precludes the constituents of concern from reaching the lower aquifer, which has been designated for municipal and domestic water supply. In addition, certain provisions of Title 23, Chapter 15 of the California Code of Regulations set forth engineering and construction requirements for the vertical and horizontal containment of wastes in place and address material compatibility requirements between site contaminants and slurry wall construction materials. Because the slurry wall containment system is not a "waste management unit," the substantive requirements of the sections of Chapter 15 cited in Table 8-4 are not applicable, but are "relevant and appropriate" to the implementation of the slurry wall containment system. The substantive requirements of the Chapter 15 provisions and NCRWQCB requirements identified in Table 8-4 are AGARS for the modified remedial action.

Resource Conservation and Recovery Act (RCRA) Requirements for Management of Excavated Soil and Contaminated Groundwater and for the Slurry Wall Construction

Action specific AGARS relating to the management of hazardous wastes are applicable to the excavation of contaminated soils. This includes excavation of surface or subsurface soil to be placed in the RCRA-equivalent disposal cell and excavation of soil for the construction of the slurry wall containment system and for the installation of a gravel drainage trench and pipe drain, which would operate in conjunction with the slurry wall excavation system. This is because some of the surface or subsurface soil to be excavated may exhibit a hazardous characteristic or may contain F032, F034 and/or F035 listed hazardous wastes, or both. These listed wastes, which are related to wood preserving operations, were listed after the date of the ROD. (See 57 Federal Register º61492, December 30, 1992). This ROD Amendment recognizes this new listing as well as the new LDRs for these listed wastes in its analysis of RCRA AGARS because EPA has concluded that this is necessary to ensure that the remedy is protective of human health and the environment. All excavated soil which contains these listed hazardous wastes or which exhibit a hazardous characteristic must be handled in accordance with all RCRA requirements relating to the management of hazardous wastes. Likewise, all contaminated groundwater must be handled in accordance with all RCRA requirements for the management of hazardous wastes if the water exhibits a hazardous characteristic or contains hazardous waste.

Once excavated, contaminated soils will be treated and disposed of in the RCRA-equivalent disposal cell in accordance with this ROD Amendment, except to the extent that they are temporarily placed in the slurry wall construction area or the soil staging and fixation area, or are returned to the slurry wall trench to form the structure of the slurry wall. These activities would ordinarily be subject to the RCRA Land Disposal Restrictions (LDRs), including the newly promulgated LDRs for F032,F034 and F035 listed hazardous wastes. (See 62 Fed. Reg. º25998, May 12, 1997). Soils temporarily placed in the slurry wall construction area or in the soil staging and fixation area, and soils returned to the slurry wall trench to form the structure of the slurry wall will not be subject to the RCRA LDRs because this ROD Amendment designates the slurry wall construction zone (including the trench and the construction area) and the soil staging and fixation area as Corrective Action Management Units (CAMUs) pursuant to 40 CFR º264.552, as implemented by the State of California through Title 22, Section 66264.552 of the California Code of Regulations (CCR). Soil placed in the RCRA-equivalent disposal cell, in accordance with this ROD Amendment, are also not subject to the LDR's because EPA has designated the RCRA-equivalent disposal cell as a CAMU. Section 8.3.7 of the ROD Amendment sets forth the CAMU designation.

Construction of the slurry wall will consist of mixing the excavated media with a slurry compound and replacing the mixture into the original excavation where it will harden and create an underground barrier to contain DNAPLs and contaminated groundwater in the shallow aquifer. Excavated soils will be placed temporarily on the ground adjacent to the trench prior to mixing and will be managed in accordance with the requirements specified in Section 8.3.7 of the ROD Amendment. The requirements for the construction of the slurry wall itself are set forth in Table 8-4.

Finally, after the backfill material is placed, a permanent cap will be placed on the ground surface of the slurry wall and the trench. No buildings or other permanent structures will be placed on top of the slurry wall structure that will impair the integrity or proper functioning of the wall. In the event that future construction results in the excavation of soils which exhibit a hazardous characteristic or contain F032, F034 or F035 hazardous wastes, the excavated soils will be managed in accordance with RCRA requirements.

Clean Water Act Storm Water Requirements

If construction activities at the site (including construction of the slurry wall containment system and the RCRA-equivalent disposal cell) involve soil disturbances, the discharges of storm water runoff associated with this construction activity will be subject to the substantive requirements of the General NPDES Permit for Storm Water Discharges Associated with Construction Activity, Order No. 92-08-DWQ, issued by the SWRCB pursuant to its delegated authority under the federal Clean Water Act (Federal Water Pollution Control Act) and regulations promulgated thereunder. In addition, the substantive portions of the General NPDES Permit for Discharges of Stormwater Associated with Industrial Activities Excluding Construction Activities, Order No. 97-03--DWQ, are action specific AGARS for industrial activities related to the remedy, such as equipment operation, and for stormwater runoff flowing over contaminated surface soils at the site.

NCRWQCB Requirements for Discharge of Treated Effluent to Beaughton Creek

The ROD prohibited the direct discharge of treated groundwater to Beaughton Creek, and therefore did not set treatment standards for such discharges. The discharge options, however, now include the discharge of treated water to Beaughton Creek. The AGARS for this discharge are the chemical and action specific substantive requirements of the federal Clean Water Act National Pollutant Discharge Elimination System (NPDES) program. This program has been delegated to each of the Regional Water Quality Control Boards (RWQCBs) in California. These chemical and action specific requirements are set forth in the substantive portions of the Waste Discharge Requirements (WDRs) issued in 1993 by the NCRWQCB. The substantive portions of Cease and Desist Order (No. 93-87) and Waste Discharge Requirements (Order No. 93-88) allow discharges to Beaughton Creek on a temporary basis, provided that these discharges are eliminated over time as the cleanup progresses. The water treatment system must be operated in a manner that minimizes discharges to Beaughton Creek by preliminarily considering use of the other disposal options allowed by the ROD, leaving Beaughton Creek as a last and least favored option. The chemical specific discharge limitations are reproduced in Table 84.

Groundwater Monitoring Requirements

EPA has published technical guidance on the development and implementation of groundwater monitoring programs in a document entitled "RCRA Ground Water Monitoring: Draft Technical Guidance," Nov. 1992 (EPA/530-R-93-001). While these requirements have not been promulgated as enforceable regulations and are therefore not AGARS, EPA has determined that they will be applied in developing a comprehensive monitoring program for the site.

Requirements for the RCRA Corrective Action Management Units (CAMUs)

The RCRA-equivalent disposal cell must satisfy the substantive RCRA and Chapter 15 landfill requirements set forth in Table 8-11 of the ROD Amendment, including the specified design standards for the liner system, the leachate collection and removal systems, leak detection systems and the final cover. In addition, state and federal regulations require that the foundation be placed on a foundation base capable of providing adequate support to prevent liner failure. RCRA requirements also address construction of run-on control and run-off management systems, management of collection and holding facilities for such systems, and preparation of a closure and post-closure plan. In addition, U.S. EPA 1987 Technical Guidance on Bottom Liners and U.S. EPA 1989 Technical Guidance on Covers should be considered in the design and construction of the disposal cell.

During construction, the landfill liner must be inspected to insure that it meets the state and federal liner standards. RCRA also requires the maintenance of security from the time that contaminated materials are placed in the landfill until the cover is in place. Upon closure of the landfill, RCRA requirements with respect to maintenance and care of the landfill and detection and evaluation monitoring (including monitoring of soil pore liquids) must be complied with in order to insure that the landfill does not release any contaminants to groundwater.

The soil staging and fixation area must satisfy the requirements for waste piles set forth in Table 8-12 of the ROD Amendment, including the specified standards for the liner, the interim cover, and the precipitation and drainage controls. It must also meet the specified construction, seismic design, and security requirements. Upon closure, the soil staging and fixation area must comply with the RCRA clean closure requirements set forth in Table 8-12.

The requirements for the slurry wall construction zone CAMU are described in Section 8.3.7, and are discussed above in connection with the RCRA requirements for construction of the slurry wall and the management of excavated soils.

10.3 Cost Effectiveness

Cost-effectiveness is determined by evaluating three of the balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; and short-term effectiveness) to determine overall effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective.

The selected remedy for the DNAPL Zone, the baseline slurry wall containment of DNAPL within the Target Area (Alternative 1) and additional containment for the Roseburg Excavation and institutional controls (Alternative 3), provides reliable containment assuming continual maintenance of the wall and mechanical systems.

The selected remedy would provide reduction in mobility of DNAPL and aqueous phase contaminants within the Target Area by use of a slurry wall containment system and of contaminated soils since the Roseburg Excavation would be covered with clean soil.

The selected remedy has high short-term effectiveness since the risks posed to the community or site workers during implementation are low, with some short-term risks in connection with the transportation of soil and with the regrading and covering of the Roseburg Excavation. No short-term risks are involved in the implementation of the proposed institutional controls.

The cost of the selected remedy assumes as baseline the cost of the proposed slurry wall containment and hydraulic control system ($11 million) plus costs related to containment and institutional controls for Alternative 3 ($1.3 million). The selection of this remedy will have short-term effectiveness and long-term effectiveness, and will provide a reduction in the mobility of DNAPL contamination, while costing less than other options.

The remedy presented in Section 9 also includes some enhancements to the remedy presented in the 1990 ROD. These include in situ bioremediation, the addition of an asphaltic concrete cover over some soils containing inorganics above background but below the subsurface soil excavation standard, and the alternative treatment option for contaminated soil in Area B. By reducing the amount of soil handling required, in situ bioremediation will reduce the short-term exposure risks associated with moving and transporting this soil. Since in situ bioremediation is expected to achieve the required level of toxicity reduction, it meets the goal of long-term effectiveness. Finally, in situ bioremediation will provide a reduction in the toxicity and volume of contaminated soil. This modification has lower short-term exposure risks, and will result in the reduction of the toxicity and volume of these contaminated soils, while costing less than the option it replaces, due to the elimination of the initial excavation step and the need for a lined treatment cell.

The addition of an asphaltic concrete cover over some soils contaminated with low levels of inorganics (i.e., above background but below the 1990 ROD subsurface soil excavation standards), will reduce the direct contact and inhalation risks in surface soil. It will also reduce the mobility of these contaminants by limiting the amount of water that comes into contact with them, thereby decreasing the potential for further groundwater degradation. The addition of this modification has low short term risks, and will result in the reduction of the mobility of the contaminants in these soils, while costing about the same as the option it replaces.

The alternative treatment option for soil in Area B provides a lower risk to site workers since little or no excavation of soils is required for in situ treatment. Since in situ bioremediation is expected to achieve the required level of toxicity reduction, this meets the goal of long-term effectiveness. Reduction of mobility, toxicity, and volume of organic contaminants will occur through in situ treatment. If the Area B soils can not be adequately treated to meet the treatment standards set forth in Table 4-2 through in situ treatment, and if modeling and/or other studies show that the cleanup levels achieved by bioventing are not protective of groundwater, then reduction of mobility, toxicity, and volume will occur by excavation and disposal in the RCRA-equivalent cell. Elimination of excavation and the lined treatment cells will significantly reduce treatment and materials handling costs. The addition of this modification has low short-term exposure risks, is expected to meet the goal of long-term effectiveness, and will result in the reduction of the toxicity and volume of these contaminated soils, while costing less than the option it replaces, due to the elimination of the initial excavation step, the need for a lined treatment cell and the need for disposal in a RCRA-equivalent disposal cell for all of the soil that is successfully treated in situ.

10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedy for the DNAPL Zone and soils outside the DNAPL Zone (including Area B), in conjunction with the 1990 ROD remedy for groundwater outside of the slurry wall, represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost-effective manner for soils and groundwater at the Baxter site. Of the alternatives evaluated, EPA has determined that the selected remedy provides the best balance of tradeoffs in terms of the nine criteria used for remedy selection. In particular, this remedy represents the best balance among long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, implement ability, short-term effectiveness, and cost.

Although the selected remedy for the DNAPL Zone does not result in the treatment of contaminants in subsurface soil, in situ biotreatment will. In addition, DNAPLs will degrade over time. The selected remedy is comparable in terms of long-term effectiveness to excavation and treatment alternatives, in part because disposal of excavated wastes also requires long-term containment in the RCRA equivalent cell and long-term monitoring of the cell. Additionally, excavation in the DNAPL Zone would be expected to remove only as much as 40 percent of the DNAPL contaminated soils. The selected remedy ranks higher in terms of short-term effectiveness and will require less time to implement.

The in situ biotreatment of soils outside the DNAPL Zone, including Area B, will maximize the use of alternative treatment options while remaining protective of groundwater.

10.5 Preference for Treatment as a Principal Element

The selected remedy uses treatment as a principal element for soils and groundwater outside of the slurry wall (1990 ROD remedy). The remedy for the DNAPL Zone uses containment, rather than treatment, to address the threats posed by contaminated subsurface soil and groundwater. Excavation and treatment of DNAPL-contaminated subsurface soil inside the slurry wall cannot remove more than an estimated 40 percent of the contaminated material, nor is it cost effective. Therefore, containment within the slurry wall, combined with in situ bioremediation for contaminated soils outside of the TI Zone, will be effective in eliminating the threat of direct exposure and reliably reducing mobility.

The modified remedy for the Area B soils uses in situ bioremediation to treat the contamination. However, if the Area B soils can not be adequately treated through in situ treatment, reduction of mobility, toxicity, and volume will occur by excavation and disposal in the RCRA-equivalent cell.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The treatment standard for non-carcinogenic PAHs, which was incorrectly listed as 0.15 ppm in the Proposed Plan and in parts of the 1990 ROD, has been corrected. The correct number (based on page 11-1 of the 1990 ROD) is 1 ppm.

In addition, the aquifer cleanup and groundwater treatment standards for tetrachlorophenol, which was inadvertently omitted from the 1990 ROD, has been added to Table 4-2. The 1.1 ppm standard is a risk based number. This standard is based on acceptable exposure levels for systemic toxicants. The ROD Amendment modifies the remedy in two additional respects which were not discussed in the Proposed Plan. First, as explained in Sections 8.3.5 and 8.3.6, the ROD Amendment sets treatment standards for Area B soil, established new subsurface soil excavation standards for organic-contaminated soil outside the DNAPL Zone, and requires modeling and/or other studies to assess the impact of these organic-contaminated soils on groundwater. Second, as explained in Section 8.3.8, the ROD Amendment allows ditch sediments to degrade naturally to the 1990 ROD standards rather than requiring excavation. This modification reflects the fact that natural flushing and attenuation has successfully reduced contaminant concentrations in ditch sediments.

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III. RESPONSE SUMMARY

1.0 INTRODUCTION

The United States Environmental Protection Agency (EPA) held a public comment period from September 29 through November 29, 1997 on EPA's Proposed Plan for revisions to the soils and groundwater cleanup remedy at the J.H. Baxter Superfund Site (Baxter) in Weed, California. The purpose of the comment period was to provide interested parties with an opportunity to comment on the Proposed Plan and related documents prepared since the 1990 Record of Decision (ROD) for the Baxter site. The Proposed Plan was issued on September 9, 1997, and, along with other documents comprising the Administrative Record was made available at the College of the Siskiyous Library in Weed, California, and the U.S. EPA Superfund Records Center in San Francisco, California.

EPA held a public meeting on October 9, 1997, at the College of the Siskiyous in Weed, California. At this meeting, EPA representatives described the alternatives evaluated for groundwater and soils in the target area containing dense, non-aqueous phase liquids (DNAPLs), presented EPA's preferred alternative and answered questions about the evaluation of the Baxter site and the remedial alternatives under consideration.

Section 113(k)(2)(B)(iv) of the Comprehensive Response, Compensation and Liability Act (CERCLA) requires that EPA respond to significant comments on the Proposed Plan.

2.0 SUMMARY OF COMMENTS AND AGENCY RESPONSES

During the public comment period, EPA received verbal comments from individuals at the public meeting and written comments from individuals, from the North Coast Regional Water Quality Control Board (NCRWQCB), and from the responsible parties - the Weed Remediation Group (WRG). The comments and EPA's responses to the comments are presented below.

A. COMMENTS FROM COMMUNITY MEMBERS

Commentor: Georgia Baxter
Date: October 9, 1997, Public Meeting Transcript

1. Comment:

I'm Georgia Baxter, BAXTER. I'd like to say J. H. Baxter and Company, of course, is in full support of this remedy, that we feel it is protective of human health and the environment, it's cost effective, and it's implementable most of all. We're looking forward to working closely with the agencies in the upcoming construction next year and we want to work closely to ensure that this is completed in a cost effective manner and that J. H. Baxter will be able to maintain its operations throughout the implementation so that we can continue to support the community as we have in the past. Thank you.

1. Response:

The EPA agrees with Mrs. Baxter that the remedy chosen is an implementable, and functional remedy. Our purpose is not to impede operations at JH Baxter during the remedial action, and with your cooperation we hope to carry out the construction in the most expeditious and cost-effective manner. If we are able to work together in a cooperative fashion, there is no doubt we will achieve that goal.

Commentor: Marilyn Blankenship
Date: October 9, 1997, Public Meeting Transcript

2. Comment:

I'm Marilyn Blankenship, Blankenship. I would like to know if there is any way to find out now whether our soil is safe for gardens. I understood that a few years ago they sent out a thing saying you shouldn't eat vegetables from your garden, which I never got one like that. I grow a garden and feed it to my family and would just like to know that if there's a way to have your soil tested that the EPA would do that.

2. Response:

Inquiries were made with all the official health agencies that may have prepared a flyer such as the one mentioned above, but none could be identified. The data we have gathered on Site contamination and the surrounding areas give us no reason to believe that the soil in the communities yards is contaminated.

EPA did soil testing in the surrounding neighborhoods. No elevated levels of no contaminants of concern were detected. However, if there was evidence to suggest that additional testing was required, the EPA or California Department of Toxic Substances could perform additional screenings. Another option would be to send in some of the vegetables you have grown for testing.

Commentor: Marilyn Blankenship, Weed, California
Date: written comment, no date

3. Comment:

I appreciated the informational community meeting at COS on October 9, 1997. 1 have also written a letter to the editor of our local paper thanking the EPA, Gale Jensen (WRG), Baxter's and Roseburg for their part in the cleanup.

I do have a concern about the overpowering creosote smell that occurs during the process of cleaning the section of dirt that they have been adding bacteria to (although it smells like creosote to me, some describe it as a "mothball odor.") This last summer it made our eyes burn and irritated our sinuses. We even had two friends cut their visit short because it was bothering them. Is there some way this problem could be addressed? Is the building of the slurry wall also going to make this problem worse while they are excavating?

I spoke to Ed Cargile, California EPA, who explained the reduced risk of cancer after the cleanup. I would like to know the health risk to people at the present time.

I have also requested that the spill in my yard be tested and would like to be notified of the results.

Thank you once again for all your efforts.

3. Response:

The EPA is committed to involving the community in the entire Superfund Process. We thank you for your participation and will continue to answer your questions, keep you informed, and service your needs.

The naphthalene odor emanating from the JH Baxter Superfund Site (Site), generated during the landfarming operations in October of 1997, was a result of the tilling of soil contaminated with organic compounds. Many neighbors to the Site were concerned that the naphthalene may be harmful and complained of the offensive and strong smell. A study was done to test whether the fumes were harmful to the workers. It was determined that individuals working next to the substance were not at risk. Therefore, there is no present risk to individuals that live near the Site.

It is still clear that although the naphthalene is not harmful, it is very unpleasant. The landfarming is currently covered, but in the spring it will be uncovered. If more tilling is necessary, measures will be taken to prevent the recurrence of the strong odors. If need be, the landfarming may be covered after tilling, or some other alternative remedy.

The building of the slurry wall should not make this problem worse because the excavation will occur around the DNAPL's (the substance responsible for the odor). DNAPL's should not be encountered during the slurry wall construction.

Testing of soil near the Site has been conducted. No elevated concentrations of contaminants of concern have been found in the soil adjacent to the Site. The soil testing Mrs. Blankenship refers to in her letter was done by the State EPA Department of Toxic Substances Control. and they will notify her of the result.

Commentor: H. Hansard, Weed, California
Date: written comment, no date

4. Comment:

In addition to my concern about the air quality at the Roseburg Baxter site (a problem that has been going on for at least 5 years since I've been there)(I've lived next door to the Baxter site for 5+ years) I'm most concerned about the noise level. Even though the new plant built by Roseburg is "state of the art" the increased noise level is so bad that I cannot sleep in my house at night. Only one room can be used for sleeping at night because the noise level from the Roseburg Baxter site is very loud. (Noise from train/logging, etc.)

4. Response:

The air quality issue has been addressed above, but to reiterate, there is no risk to health from the odor of the fumes the community has experienced.

Noise generated by the operations at JH Baxter and Roseburg Forest Products is not part of the scope of the remedy at this Site. Noise abatement is a county issue. You may wish to contact the Siskiyou County Health Department at (530) 841-4040.

B. COMMENTS FROM STATE AGENCIES

Commentor: Susan A. Warner, North Coast RWQCB
Date: October 28, 1997

5. Comment:

The public comment period on the proposal to modify the groundwater and soils remedy is coming to a close. The Regional Water Board has made informal comments, to the US Environmental Protection Agency (US EPA) on the proposals to modify the remedy, and those informal comments are still valid.

As you know, the Regional Water Board concurs with EPA's preferred alternative, which includes the concept of a containment system for the dense, non-aqueous phase liquids and associated contaminated groundwater. However, such a containment system is not currently consistent with Regional Water Board requirements, including the basin plan, which requires that water quality objectives be met throughout the contaminant plume area. However, non-attainment of water quality objectives can be recognized, and this remedy found to be consistent with the Basin Plan if the Regional Water Board adopts a Containment Zone pursuant to State Water Resources Control Board Resolution 92-47, as modified in 1996. Section III.H.7 of Resolution 92-49 allows for containment zones to be established where the US EPA has approved a Technical Impracticability Waiver, provided that:

a. the substantive provisions of Sections III.H.2.b., e., f., and g. are met;

b. interested parties described in III.H.8.a. are included in the public participation process; and

C. site information is forwarded from the approving agency to the Regional Water Board so that sites for which Technical Impracticability Waivers have been approved can be included in the master listings described in Section III.H.10.

The Resolution 92-49 process involves consideration of this containment zone in a noticed public meeting before the Regional Water Board. In our letter of April 17, 1997, we indicated to the US EPA and to parties who received a copy of the letter that most of the substantive portions of Resolution 92-49 will be met through US EPA's Technical Impracticability Waiver (TI Waiver) process.

The provisions required by Resolution 92-49 that are not covered in the TI Waiver process include off-site mitigation requirements, and specific contingency plan language in the event of a containment zone failure. Measures to fulfill Resolution 92-49 off-site mitigation requirements can include enhancement of water quality through reclamation activities at the site that would reduce water diversions from Beaughton Creek. Additional specific measures to address Resolution 92-49 requirements can be proposed by the responsible parties as part of the Regional Water Board public process for consideration of a contamination zone.

The Regional Water Board staff also concurs that additional proposed modifications to the soils remedy may be needed. The Regional Water Board staff believes that disposal options for treated soils outside of the containment (TI) zone need to be consistent with the existing record of decision and Scope of Work document where feasible. Remediated soils should not be disposed as surface soils without addressing the probable residual contamination present in these soils and without further restrictions to ensure there is no threat to water quality. If soils outside of the TI Waiver zone, such as Area B soils, are proposed for disposal or to remain in place in areas which are not within the containment zone area, then the disposal area and controls would need to be found to be in conformance with the provisions of Chapter 15, as required previously. While there may be some flexibility under the engineered alternative section of Chapter 15 (º2510(b)), adequate design requirements for the protection of water quality would need to be assured. This does not prelude use of alternative remediation, but would require that the PRPs demonstrate with adequate technical information that such remediation of soil material at a particular location would not be a short-term or long-term threat to water quality. If an adequate technical showing is made of the protectiveness of a proposal, the Regional Water Board could concur with a site-specific and situation-specific determination that some alternative remediation actions were appropriate.

Thank you for the opportunity of providing comments on the modifications to the groundwater and soil remedy at the Weed site. Bill Erdei and I look forward to a continued close working relationship with US EPA on cleanup of this site.

5. Response:

As explained in the Focused Feasibility Study (FFS) for the J.H. Baxter Site, EPA has concluded that Section III.H of Resolution 92-49, pertaining to the designation of containment zones, is not an ARAR for the construction of the slurry wall containment system. (See FFS, pages 6-12 and 6-13.) Section III.H is a waiver provision which is equivalent to the federal Technical Impracticability (TI) waiver, as implemented under the CERCLA "Guidance for Evaluating the Technical Impracticability of Ground Water Restoration," OSWER Directive 9234.2-25.

EPA has addressed your concerns about the 92-49 off-site mitigation requirements and contingency plan requirements in the ROD Amendment. Specifically, the ROD Amendment emphasizes reuse on the Roseburg log decks as the preferred disposal option for the treated water. This will promote water reclamation at the Site and reduce water diversions from Beaughton Creek. The ROD Amendment also incorporates contingency plan provisions in the event of a containment zone failure.

EPA shares your concern about the disposal of treated soil as surface soils, and has decided to exclude this soil disposal option in the ROD. The ROD requires that excavated and/or treated soils be disposed of on-site in RCRA equivalent, disposal cells. The only exception is Area B soils, which may be left in place if EPA finds that bioventing will achieve standards that are protective of ground water.

Commentor: Bill Erdei, North Coast RWQCB
Date: March 17, 1998

6. Comment:

". . . . . The state accepts the use of the "RCRA Groundwater Monitoring: Draft Technical Guidance" in lieu of Chapter 15 monitoring requirements to monitor for potential releases from the slurry wall containment system. The State disagrees with the characterization of some of the Chapter 15 requirements in this ROD Amendment as only relevant and appropriate, but it is satisfied that the remedial action will comply with all of the requirements".

7. Comment:

"The state disagrees with US EPA's conclusion that SRWCB Resolution No. 92-48, Paragraph III. H, is not a ARAR for the slurry wall containment system because the State believes that it imposes substantive conditions that must be meet prior to waving groundwater AGARS. However, the State has determined that remedial action will substantively comply with Resolution No. 92-49, and is therefore satisfied with this ROD amendment."

C. COMMENTS BY THE RESPONSIBLE PARTIES

Commentor: Richard Andrachek, Fluor Daniel GTI
Date: November 20, 1997

This letter provides the Weed Remediation Group's (WRG) comments on the Proposed Plan for the JH Baxter Superfund Site in Weed, CA, which was issued by EPA in late September, 1997. The WRG has three comments, which are provided below an the Proposed Plan. 7.
Comment:

Comment 1 - The WRG is in support of the modifications to the groundwater and soils remedy identified in the Proposed Plan. The WRG believes that the modifications discussed in the Proposed Plan are protective of human health and the environment, can be effectively implemented over a two year period with manageable disruption to the business operations of JH Baxter and Roseburg Forest Products and are cost-effective.

Comment 2 - Sufficient flexibility needs to be incorporated into the Proposed Plan for management of contaminated soils that may be excavated after the remedy is implemented. The Proposed Plan will allow existing impacted subsurface soils to remain in place in areas of the site that are within the slurry wall (TI Zone). The WRG believes that the Proposed Plan should include the option of reusing any contaminated subsurface soils that may be excavated due to future construction as subsurface backfill at other locations within the slurry wall. The WRG believes that these management approaches are consistent with approaches provided by EPA's rules on RCRA Corrective Management Units (CAMU) (40 CFR 264.552) and "Areas of Contamination (AOC)" (OSWER Directive 93473-05FS, July 1989). Designation of a CAMU or AOC would facilitate a reliable, protective, long-term solution for the management of contaminated soils that may be excavated post-remedy. Additionally, contingency language should be provided to allow for reopening or extending the RCRA-equivalent disposal cell for disposal of these soils if excavated post-remedy.

Comment 3 - Previous design submittals for the surface soil have included placement and maintenance of a gravel wearing surface over the southern portions of the J.H. Baxter Property. The Proposed Plan fails to mention the inclusion of the gravel wearing surface and states that any wearing surfaces placed at the site would be constructed of asphalt-concrete. The WRG requests that the proposed gravel wearing surface be included in the remedy modifications. The gravel wearing surface has already been incorporated as redundant protection of the surface soils in this area, since the area will be remediated to below the surface soils excavation standard established in the Record of Decision (ROD). After excavation, the average arsenic concentration will be equal to or less than the ROD-established cleanup standard of 8 mg/kg. Other chemicals for which cleanup standards have been established in the ROD are already below their respective criteria in this area of the site. Therefore, placement of an asphalt concrete wearing surface in this area is overly protective and very costly, while the gravel wearing surface provides adequate protection at a reasonable cost.

Thank you for considering these comments. Please call me (510/370-3990) if you would like to discuss these comments.

8. Response:

As stated above in response to Georgia Baxter's statement, we are pleased that we have been able to develop modifications to the groundwater and soils remedy that are protective of human health and the environment, and are acceptable to EPA and the WRG.

The EPA would like to give flexibility to operations at JH Baxter and Roseburg Forest Products, but has a primary responsibility to human health and the environment. Leaving contamination in place for perpetuity is not a preferred remedy, and must be monitored very carefully.

Consequently, the remedy will include institutional controls to ensure that the remedy remains protective. EPA will work with the WRG to develop a Soils Management Plan that would set out a course of action to be taken in the event that contaminated soils are excavated during future construction. This plan may include use of the RCRA-equivalent cell for possible disposal of contaminated soils excavated subsequent to the implementation of the remedy.

Your proposal of a gravel wearing surface rather than an asphalt wearing surface is acceptable. As you stated in your comment letter of November 20, 1997, the soils underlying the gravel wearing surface will be remediated to below the surface soils excavation standard established in the 1990 Record of Decision.

Table 1-1

Pre-1990 ROD Contaminant Concentration Ranges

	Subsurface Soils		Ground Water	
	Average Site Levels (ppm)	Maximum Site Levels (ppm)	Average Site Levels (ppb)	Maximum Site Levels (ppb)
Arsenic	21	12,100	37	1,740
Chromium	12	1,350	13	122
Copper	11	604		37,100
Zinc	40	1,120	170	23,000
Pentachlorophenol(PCP)	160	1,300	2	210
Carcinogenic PAHs 1(cPAH)	18	420	360	6,000
Non-Carcinogenic PAHs 2(ncPAH)	30	6,100	635	251,800
Benzene			8	170
Dioxins	0.0035	5.7	12	13

Source: ROD Table 4-1

1 Carcinogenic PAHs: Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(a)pyrene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene.

2 Non carcinogenic PAHs: Naphthalene, 2-methylnapthalene, Acenaphthylene, Acenaphthene, Dibenzofuran, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(ghi)perylene.

Table 4-1
Excavation and Treatment Standards in the 1990 ROD

CONSTITUENTS OF CONCERN	ROD Standards			
	SURFACE SOIL EXCAVATION STANDARDS 1 (mg/kg)	SUBSURFACE SOIL EXCAVATION STANDARDS 2 (mg/l)	SEDIMENT EXCAVATION STANDARDS 2 (mg/kg)	SOILS TREATMENT STANDARDS 2 (mg/l)
Arsenic	8	5(TCLP)	8	5(TCLP)
Chromium	500	5(STLC)	18	5(STLC)
Copper	2,500	25(STLC)	Not present in sediment	25(STLC)
Zinc	5,000	250(STLC)	26	250(STLC)
Pentachlorophenol(PCP)	17	1.7(STLC)	1.0	1.7(STLC)
Tetrachlorophenol	2,800	Not present in subsurface soil	1.0	1.0(TCLP)
Carcinogenic PAHs (cPAH) 3	0.51	0.005(TCLP)	0.5	0.005(TCLP)
Non-carcinogenic PAHs (ncPAH)4	43,000	1.0(TCLP)	0.5	1.0(TCLP)
Dioxins	0.001	0.001(TCLP)	Not present in sediment	0.001(TCLP)
Furans	0.001	Not Specified in 1990 ROD	Not present in sediment	Not Specified in 1990 ROD

Table 4-1 (Continued)
Excavation and Treatment Standards in the 1990 ROD

CONSTITUENTS OF CONCERN	ROD Standards AQUIFER CLEANUP AND GROUNDWATER TREATMENT STANDARDS 2 (mg/l)
Arsenic	0.005
Chromium	0.008
Copper	0.011
Zinc	0.090
Benzene	0.001
Pentachlorophenol	0.0022
Carcinogenic PAHs(cPAH)	0.005
Non-Carcinogenic PAHs (ncPAH)	0.005
Dioxins	2.5×10^{-8}

Abbreviations:

PAH - polynuclear aromatic hydrocarbon
ppm - parts per million
ROD - Record of Decision
STLC - Soluble Threshold Limit Concentration
TCLP - Toxicity Characteristic Leaching Procedure
TTLC - Total Threshold Limit Concentration

Notes:

1) From 1990 ROD, Table 4-3.
2) From 1990 ROD, Table 4-1, and 1990 ROD Section II.
3) cPAHs: Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(a)pyrene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene
4) ncPAHs: Naphthalene, 2-methylnaphthalene, Acenaphthylene, Acenapththene, Dibenzofuran, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(ghi)perylene

Table 4-2
Excavation and Treatment Standards in the ROD as Modified by the ROD Amendment

	Amended ROD Standards			
CONSTITUENTS OF CONCERN (COC)	SURFACE SOIL EXCAVATION STANDARDS (mg/kg)	SUBSURFACE SOIL EXCAVATION STANDARDS 1	SEDIMENT CLEANUP STANDARDS (NATURAL ATTENUATION) (mg/kg)	TREATMENT STANDARDS FOR SOILS PLACED IN RCRA-EQUIVALENT CELL 2 (mg/l)
Arsenic	8	5(TCLP)(mg/l)	8	5(TCLP)
Chromium	500	5(STLC)(mg/l)	18	5(STLC)
Copper	2,500	25(STLC)(mg/l)	Not present in sediment	25(STLC)
Zinc	5,000	250(STLC) (mg/l)	26	250(STLC)
Pentachlorophenol(PCP)	17	7.4(mg/kg)	1.0	1.7(STLC)
Tetrachlorophenol	2,800	Not present in subsurface soil	1.0	1.0(TCLP)
Carcinogenic PAHs (cPAH) 3	0.51	3.4(mg/kg)	0.5	0.005(TCLP)
Non-carcinogenic PAHs (ncPAH)4	43,000	3.4(mg/kg)	0.5	1.0(TCLP)
Dioxins	0.001	0.001(mg/kg)	Not present in sediment	0.001(TCLP)
Furans	0.001	0.001(mg/kg)	Not present in sediment	0.001(TCLP)

Table 4-2 (Continued)
Excavation and Treatment Standards in the ROD as Modified by the ROD Amendment

		ROD Standards	
CONSTITUENTS OF CONCERN (COC)	TREATMENT STANDARD FOR AREA B 5 (mg/kg)	AQUIFER CLEANUP AND GROUNDWATER TREATMENT STANDARDS(mg/l)	GROUNDWATER TREATMENT STANDARDS FOR DISCHARGES TO BEAUGHTON CREEK (mg/l)
Arsenic	Not a COC for Area B soil	0.005	0.005
Chromium	Not a COC for Area B soil	0.008	0.005
Copper	Not a COC for Area B soil	0.011	0.005
Zinc	Not a COC for Area B soil	0.090	0.010
Benzene	Not present in Area B soil	0.001	0.001
Pentachlorophenol	7.4	0.001	0.0003
Tetrachlorophenol	Not present in Area B soil	1.1	0.0004
Carcinogenic PAHs (cPAH)	3.4	0.005	0.001
Non-Carcinogenic PAHs (ncPAH)	3.4	0.005	0.001
Dioxins	0.001	2.5 x 10 -8	2.5 x 10 -8
Furans	0.001	Not present in groundwater	Not present in groundwater

Table 4-2 (Continued)
Excavation and Treatment Standards in the ROD as Modified by the ROD Amendment

Abbreviations:

cPAH - carcinogenic PAH
COC - Constituents of Concern
ncPAH - noncarcinogenic PAH
PAH - polynuclear aromatic hydrocarbon
ppm - parts per million
ROD - Record of Decision
STLC - Soluble Threshold Limit Concentration
TCLP - Toxicity Characteristic Leaching Procedure

Notes:

1) There will be no excavation of subsurface soils in the TI zone.

2) Standard tests will be modified by the use of deionized water as the leaching solution rather than a citric acid buffer

3) cPAHs: Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(a)pyrene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene

4) ncPAHs: Naphthalene, 2-methylnaphthalene, Acenaphthylene, Acenapththene, Dibenzofuran, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(ghi)perylene

5) If in situ bioventing of Area B soils is not successful, soils will be excavated and treated to the soil treatment standards, and disposed of in a RCRA-equivalent cell. If in situ bioventing is capable of achieving the treatment standards, the Area B soils will be left in place after treatment has been completed. Area B soils which do not meet the surface soil excavation standard will be covered with 2 feet of clean soil and left in place after treatment has been completed.

<IMG SRC 98033B>
<IMG SRC 98033C>

Table 8-1
Comparison of Remedial Alternatives

Criteria and Description	Alternative 1 No Further Action (Slurry Wall Containment, Hydraulic Control, Monitoring)	Alternative 2 Excavation to Ground Water Table, On-site Biotreatment, Stabilization, On-site Disposal	Alternative 3 Additional Containment and Institutional Controls
Overall Protection of Human Health and the Environment			
Protection of the human health and the environment, in the short and long term, from unacceptable risks at the site, by eliminating reducing or controlling exposures to target cleanup levels.	Source Control is achieved by containment of the DNAPL zone within the Target Area.	DNAPL zone is contained within the Target Area. A significant portion of the contaminated subsurface soils removed and treated.	Source control is achieved by containment of the DNAPL zone within the Target Area. Roseburg Excavation is regraded and covered with a protective soil layer, reducing potential for surface water contamination and leaching into the subsurface.
	Risk of further migration of contaminants within the Target Area minimized. There is no reduction in potential risk to human health from ingestion of ground water or through direct contact with subsurface soils.	Risk of further migration of contaminants within the Target Area is minimized. Exposure potential to contaminants in subsurface soils is also minimized. No reduction in potential risk through ingestion of ground water is achieved.	Risk of further migration of contaminants in the Target Area is minimized. Exposure potential to contaminants in subsurface soils is reduced. Potential risk through ingestion of ground water is reduced.
	Target levels for ground water and subsurface soil concentrations are not achieved.	Target levels for ground water in the upper aquifer are not achieved, however, treated soil is expected to achieve target soil leachate standards.	Target levels for ground water and subsurface soil concentrations are not achieved.
Compliance with AGARS			
Compliance with chemical-specific, location-specific, and action-specific AGARS.	Requires a waiver of the groundwater cleanup standards set forth in the ROD based on the technical impracticability from an engineering perspective, as part of a ROD amendment.	Requires a waiver of the groundwater cleanup standards set forth in the ROD based on the technical impracticability from an engineering perspective, as part of a ROD amendment.	Requires a waiver of the groundwater cleanup standards set forth in the Rod based on the technical impracticability from an engineering perspective, as part of a ROD amendment.

Table 8-1 (Continued)
Comparison of Remedial Alternatives

Criteria and Description	Alternative 1 No Further Action (Slurry Wall Containment, Hydraulic Control, Monitoring)	Alternative 2 Excavation to Ground Water Table, On-site Biotreatment, Stabilization, On-site Disposal	Alternative 3 Additional Containment and Institutional Controls
Long-Term Effectiveness and Permanence untreated waste.	Magnitude of residual risk to receptors outside the Target Area from untreated waste within the Target Area is reduced, since slurry wall containment prevents further migration of contaminants from the Target Area. Inside the Target Area, no risk reduction is achieved. No institutional controls are provided to eliminate or minimize the potential pathway for exposure to contaminants left in the subsurface soils.	Alternative 2 permanently reduces the magnitude of, but does not completely eliminate the residual risk from untreated waste because some residual waste will still remain within the Target Area. However, no institutional controls are provided, and therefore, the possibility of exposure to the contaminated subsurface soils remaining in place is no eliminated. The potential risk associated with ingestion of contaminated groundwater is also not eliminated.	Alternative 3 reduces the magnitude of the residual risk due to contaminated groundwater and untreated waste through institutional controls and regrading and placing a protective soil cover over the Roseburg Excavation, but does not eliminate the potential for future increased risk if institutional controls are not implemented and maintained.
Adequacy and reliability of long-term management controls.	Reliability of slurry wall containment depends on continued ground water monitoring, effectiveness evaluation, implementing contingency actions when needed, and maintenance.	Reliability of slurry wall containment depends on continued ground water monitoring, effectiveness evaluation, implementing contingency actions when needed, and maintenance. RCRA disposal cells also require maintenance and long-term monitoring.	Reliability of slurry wall containment depends on continued ground water monitoring, effectiveness evaluation, implementing contingency actions when needed, and maintenance. Long-term implementation and management of institutional controls are needed.
Reduction of Toxicity, Mobility, and Volume			
Amount of hazardous material treated.	None	Treated soil volume is estimated to be 107,600 cy (in-place) based on the minimum impacted soil estimate, and 719,000 cy (in-place) based on the maximum impacted soil estimate.	None

Table 8-1 (Continued)
Comparison of Remedial Alternatives

Criteria and Description	Alternative 1 No Further Action (Slurry Wall Containment, Hydraulic Control, Monitoring)	Alternative 2 Excavation to Ground Water Table, On-site Biotreatment, Stabilization, On-site Disposal	Alternative 3 Additional Containment and Institutional Controls
Reduction of Toxicity, Mobility, and Volume (Continued)			
Degree of reduction in toxicity, mobility, or volume.	Mobility of contaminants within the Target Area is reduced by the slurry wall containment system.	Mobility of contaminants within the Target is reduced by the slurry wall containment.	Mobility of contaminants within the Target Area is reduced by the slurry wall containment.
	No reduction in toxicity or volume of the subsurface soil contaminants is achieved (no treatment).	Reduction in volume and toxicity of the organic contaminants in the subsurface soils is achieved through removal and biotreatment. Stabilization immobilizes the inorganic contaminants, but does not reduce volume or toxicity.	Some additional reduction in mobility is achieved through regrading and placement of a protective soil cover over the Roseburg Excavation. No reduction in volume or toxicity of the subsurface soil contaminants is achieved (no treatment).
	The volume and toxicity of the COCs in groundwater within the Target Area will be somewhat reduced over a long period of time.	The volume and toxicity of the COCs in groundwater within the Target Area will be somewhat reduced over a long period of time.	The volume and toxicity of the COCs in groundwater within the Target Area will be somewhat reduced over a long period of time.
Degree to which treatment is irreversible.	Not applicable, no treatment	Irreversible for biotreatment. Stabilization of inorganic contaminants may be partially reversible, should stabilized soil breakdown overtime.	Not applicable, no treatment
Type and quantity of residuals remaining after treatment.	All impacted soils remain in place.	Based on the minimum impacted soil volume estimate, approximately 64,000 cy is left in place. Based on the maximum impacted soil volume estimate, 564,000 cy of impacted soils is left in place.	All impacted subsurface soils remain in place.
Short-Term Effectiveness			
Short-term risks to the community during implementation of an alternative.	Slurry wall construction is not anticipated to pose any risks to the community.	Excavation, treatment, and disposal of large quantities of soil could pose a health risk, and odor nuisance for the community. Monitoring and control of dust emissions and odor would be implemented during execution of this alternative Transportation of large quantities of soil could be a potential nuisance to the community, and a potential traffic hazard.	If the Roseburg Excavation is covered, transportation of imported soils would not pose a health risk, but could be a nuisance for the community, as well as a traffic risk for vehicular accidents.

Table 8-1 (Continued)
Comparison of Remedial Alternatives

Criteria and Description	Alternative 1 No Further Action (Slurry Wall Containment, Hydraulic Control, Monitoring)	Alternative 2 Excavation to Ground Water Table, On-site Biotreatment, Stabilization, On-site Disposal	Alternative 3 Additional Containment and Institutional Controls
Short-Term Effectiveness (Continued)			
Potential impacts on workers during remedial actions, and effectiveness. and reliability of protective measures.	There is a potential for exposure to fugitive dust and to soils contaminated with carcinogenic compounds during slurry wall trench excavation activities. Protection from potential risks is achievable with standard practices.	There is increased potential for exposure to fugitive dust and to soils contaminated with carcinogenic compounds during excavation activities due to the high quantities of soils to be excavated. Dust and odor is an issue during landfarming. Dust is also an issue during stabilization. Control of potential risks is achievable with standard safety practices.	There is a potential for exposure to fugitive dust and to soils contaminated with carcinogenic compounds during slurry wall trench excavation activities and early stages of the Roseburg Excavation area regrading and covering operations. Control of potential risks is achievable with standard safety practices.
Potential environmental impacts/mitigation measure effectiveness.	There is a potential for adverse environmental impacts if free-phase DNAPL is encountered during trench excavation and/or if the OCA is penetrated, and uncontrolled migration of the DNAPL occurs.	There is a potential for adverse environmental impacts if free-phase DNAPL is encountered during trench excavation and/or if the OCA is penetrated, and uncontrolled migration of DNAPL occurs.	There is a potential for adverse environmental impacts if free-phase DNAPL is encountered during trench excavation and/or if the OCA is penetrated, and uncontrolled migration of DNAPL occurs.
Time until protection is achieved.	Within 1 year	Within 3-5 years for the minimum impacted soils volume estimate, and 5-7 years for the maximum impacted soils volume estimate, after implementation of the slurry wall containment baseline remedy.	Within 1 to 2 years
Implement ability			
Technical feasibility.	Soil-bentonite slurry wall is a conventional technology readily installed and maintained.	Soil-bentonite slurry wall is a conventional technology readily installed and maintained. Technology, equipment, and services for excavation and treatment processes included under this alternative are readily available and relatively easily implemented. However, high quantities of imported soil needed for backfilling may not be readily available from a nearby source. Also, extensive areas required for landfarming may pose a problem, as well as the areas needed for the RCRA disposal cells. Odor and dust can be problem during implementation. Also, remedial activities could significantly impact site operations.	Soil-bentonite slurry wall is a conventional technology readily installed and maintained. Services and equipment for regrading and placing of a protective soil cover over the Roseburg Excavation would be readily available. Approximately 33,400 cy of imported soil needed for backfilling should be available from a nearby source.
Implement ability (continued)			

Table 8-1 (Continued)
Comparison of Remedial Alternatives

Criteria and Description	Alternative 1 No Further Action (Slurry Wall Containment, Hydraulic Control, Monitoring)	Alternative 2 Excavation to Ground Water Table, On-site Biotreatment, Stabilization, On-site Disposal	Alternative 3 Additional Containment and Institutional Controls
	Slurry walls are considered to be reliable containment systems when built properly.	Slurry walls are considered to be reliable containment systems when built properly. Reliability of excavation in removing the COCs would depend on the delineation of the extent of contamination in the subsurface. Landfarming has been shown to be reliable in reducing the concentrations of ncPAHs, and stabilization in reducing the leachability of the inorganic COCs.	Slurry walls are considered to be reliable containment systems when built properly. Institutional controls have to be managed for the long-term for reliability
	Additional remedial actions can be implemented within the Target Area.	Excavation of approximately 900,000 cy of soils. and treatment by landfarming would interfere with additional remedial actions during their implementation. Additional remedial actions can be implemented subsequently.	Additional actions can be readily implemented. Slurry wall, regrading and covering the Roseburg excavation or the institutional controls would not interfere with other remedial alternatives.
	Effectiveness of containment will be monitored through groundwater and DNAPL monitoring	Effectiveness of the slurry wall containment will be monitored through ground water monitoring. Effectiveness of bioremediation and stabilization will be evaluated through sampling during remediation.	Effectiveness of the slurry wall containment will be monitored through ground water monitoring.
Availability of services and materials.	Services and equipment for construction of slurry walls are readily available.	Services and equipment are readily available for construction work. Obtaining approximately 700,000 cy of clean imported soil from a nearby source may not be possible. Vendors offering landfarming and stabilization technologies are available.	Community relations, legal services, and contractors are available. Obtaining approximately 33,400 cy of clean imported soil from a nearby source should be possible. Effective institutional controls

Table 8-1 (Continued)
Comparison of Remedial Alternatives

Criteria and Description	Alternative 1 No Further Action (Slurry Wall Containment, Hydraulic Control, Monitoring)	Alternative 2 Excavation to Ground Water Table, On-site Biotreatment, Stabilization, On-site Disposal	Alternative 3 Additional Containment and Institutional Controls
Incremental Cost over baseline ($ in thousands)			
Capital Costs.	0	$25,000(1)-158,000(2)	$1,000
Annual O&M Costs.	0	$46(1)(3)-102 (2) (3)	$8(3)
Total Project Cost (Capital plus 30-year O&M, Present Worth)	0	$26,000(1)-160,000 (2)	$1,300
State Acceptance			
	Not acceptable.	Acceptable in concept.	Acceptable in concept and preferred.

(1) Cost based on the minimum impacted soil volume estimate.
(2) Cost based on the maximum impacted soil volume estimate.
(3) Annual O&M costs above do not include the 5-year review cost of $30,000 (assumed) recurring every 5 years. However, it is included in the present worth estimates.

Source: FFS Table 6-3

Table 8-2
Federal Applicable or Relevant and Appropriate Requirements
J. H. Baxter Superfund Site 1990 ROD

Standard, Requirement, Criteria or Limitation	Citation	Description	Comments
Safe Drinking Water Act	40 U.S.C. °300		
Underground Injection Control Regulations	40 C.F.R. Parts 144-147	Provides for protection of underground sources of drinking water.	A permit is not required for on-site CERCLA response actions, but substantive requirements would apply for reinjection into groundwater of treated water.
Solid Waste Disposal Act (Resource Conservation and Recovery Act)	42 U.S.C. °°3251-3259, 6901-6987		This law has been amended by the Resource Conservation and Recovery Act (RCRA) and the Hazardous and Soil Waste Amendments (HSWA).
Identification and listing of Hazardous Waste	40 C.F.R. Part 264.1	Defines those solid wastes which are subject to regulation as hazardous wastes under 40 C.F.R. Parts 261-265 and Parts 124, 270, 271, and Subtitle C regulates treatment and disposal of hazardous waste.	Under CERCLA, SWDA requirements may be relevant and appropriate under the circumstances of the release at the site. RCRA Subtitle C regulates any solid wastes containing arsenic or pentachlorophenol which pose a threat to public health or welfare or the environment. These are termed "hazardous substances", and disposal regulations require treatment to specific standards for proper disposal.
Release from Solid Waste Management Units	40 C.F.R. Part 264 Subpart F	Establishes maximum contaminant concentrations that can be released from hazardous waste units in Part 264, Subpart F.	The maximum contaminant concentrations that can be released from hazardous waste units are identical to the MCLs.
Standards Applicable to Generators of Hazardous Waste	40 C.F.R. Part 262	Establishes standards for generators of hazardous waste.	Transportation and disposal of filter cake and spent carbon and any other hazardous wastes they may need off-site disposal will comply with these requirements.

Table 8-2 (Continued)
Federal Applicable or Relevant and Appropriate Requirements
J. H. Baxter Superfund Site 1990 ROD

Standard, Requirement, Criteria or Limitation	Citation	Description	Comments
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 C.F.R. Part 264	Establishes minimum national standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.	The substantive portions of these regulations will be incorporated into the remedies identified in this ROD.
Land Disposal	RCRA Sections 3004 (d) (3, (e) (3) 40 C.F.R. Part 268	Effective 11/8/88 disposal of contaminated soil or debris from CERCLA Response action or disposal prohibitions and/or treatment standards.	Established a timetable for restriction of burial of wastes and other hazardous materials. Applicable for alternative involving off- or on-site disposal of contaminated soils.
Clean Air Act	42 U.S.C. °°7401-642	Regulates air quality and particulate emissions during excavation.	The substantive requirements will be met for Air Pollution Control District rules for excavation alternatives.
Hazardous Materials Transportation Act	49 U.S.C. °°1801-1813		
Hazardous Materials Transportation Regulations	49 C.F.R. Parts 107, 171-177	Regulates transportation of hazardous materials.	Regulations required for transportation of hazardous materials to the site and wastes from the site.
Fish and Wildlife Coordination Act	16 U.S.C. °°661-666	Requires consultation when Federal Department or agency proposes or authorizes any modification of any stream or other water body and adequate provisions for protection of fish and wildlife resources.	If an alternative developed would involve any modifications of nearby stream.

Table 8-2 (Continued)
Federal Applicable or Relevant and Appropriate Requirements
J. H. Baxter Superfund Site 1990 ROD

Standard, Requirement, Criteria or Limitation	Citation	Description	Comments
Executive Order on Protection of Wetlands	Exec. Order No. 11,990 40 C.F.R. °6.302(a) and Appendix A	Requires Federal agencies to avoid to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practical alternative exists.	If an alternative developed would involve any modification or loss of wetlands.

Table 8-3
California Applicable or Relevant and Appropriate Requirements
J. H. Baxter Superfund Site 1990 ROD

Standard, Requirement, Criteria or Limitation	Citation	Description	Comments
California Air Resources Act	Health & Safety Code, Div. 26 Sec. 39000 et seq.	Regulates both nonvehicular and vehicular sources of air contaminants in California.	The local Air Pollution Control District sets allowable discharge standards. Emission from heavy equipment and excavation dusts will need to comply with APCD standards.
	17 CCR, Part III, Chapter 1, Sec. 60000 et. seq.		CA regulatory agency is the Air Resources Board. Local regulatory agencies are the Air Pollution Control Districts.
California Safe Drinking Water Act	Health & Safety Code, Div. 5, Part 1, Chapter 7, Sec. 4010 et. seq. 22 CCR, Div. 4, Chapter 15, Sec. 64401 et seg.	Regulations governing public water systems. Drinking Water Quality Standards -Maximum Contaminant Levels (MCLs), Secondary Maximum Contaminant Levels (SMCLS).	The State MCL of 1 ppb for benzene was selected as a groundwater standard for this site. CA Regulatory Agency: Department of Health Services, Sanitary Engineering.
Porter Cologne Water Quality Control Act	Water Code, Div. 7, Sec. 13000 et. seq.	Establishes authorities of the State and Regional Water boards to protect water quality by regulating waste disposal and by requiring cleanup of hazardous condition.	The Basin Plan was used to establish surface water discharge limitations and sediment clean-up standards.
California Hazardous Waste Control Laws	Health & Safety Code, Div. 20, Chapter 6.5, Sec. 25100 et.	Regulations governing hazardous waste control; management and control of hazardous waste facilities; transportation; laboratories; classification of extremely hazardous, hazardous, and non-hazardous waste.	These regulations were used to establish hazardous waste clean-up levels, facility closure requirements, and requirements for siting and construction of a waste disposal facility. CA Regulatory Agency: Department of Health Services.

Table 8-3 (Continued)
California Applicable or Relevant and Appropriate Requirements
J. H. Baxter Superfund Site 1990 ROD

Standard Requirement, Criteria or Limitation	Citation	Description	Comments
California Toxic Pits Cleanup Act (TPCA)	Health & Safety Code, Sec. 25250 et seq.	Regulates the closure of surface impoundment's containing hazardous waste.	Several units identified by the MCRWQCB are present at the site. Several TPCA units present at site.
State Action Levels	DHS Criteria	Criteria setting chemical specific concentration levels. Numerical limits designed to protect human health from chemical constituents in drinking water. Recommended acceptable limits. Action levels are drinking water exposure Criteria implemented throughout the state. They are developed by DHS Sanitary Engineering Branch to supplement Safe Drinking Water Act standards.	Applied Action Level of 2.2 ppb was used to identify the clean-up standards for pentachlorophenol. California Regulatory Agency: Department of Health Services; Sanitary Engineering Branch.
Criteria for Identification of Hazardous and Extremely Hazardous Wastes-Threshold Limit Concentrations	22 CCR, Div. 4, Chapter 30, Art. 11, Sec. 66693 et seq.	Promulgated criteria to determine if a material is hazardous. Includes Soluble Threshold Limit Concentrations (STLCs) and Total Threshold Limit Concentration (TTLCs).	TTLC and STLC criteria were used to identify soil clean-up standards. CA Regulatory Agency; Department of Health Services.

Table 8-4

FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
Porter-Cologne Water Quality Control Act °°1058, 13140-47, 13260,13263 and 13269; 23 CCR °° 2510(a), 2511(d)	The specific Title 23, Chapter 15 requirements listed below.	Relevant and Appropriate to the slurry wall containment system; applicable to the RCRA-equivalent disposal cell and the soil staging and fixation area.	Section 2510(a) provides that the Chapter 15 regulations are applicable to the water quality aspects of discharges to land and establish waste management requirements for specifically enumerated waste management units. Section 2511 (d) provides that actions taken by or at the direction of public agencies to clean up or abate conditions of pollution resulting from unintentional or unauthorized releases of waste or pollutants to the environment are exempt from the requirements of Chapter 15, provided that remedial actions intended to contain such wastes at the place of release are required to implement applicable provisions of Chapter 15 to the extent feasible, and provided that wastes removed from the original place of release shall be discharged in accordance with the requirements of Chapter 15, Article 2.	Sections 2510(a) and 2511 (d) are the sources of the Chapter 15 action specific AGARS since they do not contain prescriptive standards themselves. These AGARS are relevant and appropriate, rather than applicable, to the slurry wall containment system because the slurry wall containment system is not a "waste management unit" as that term is defined in Chapter 15. These AGARS are. applicable to the RCRA-equivalent disposal cell and the soil staging and fixation area

Table 8-4 (Continued)
FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
Porter-Cologne Water Quality Control Act °° 1058, 13140-47, 13260,13263 and 13269	23 CCR °2510(b)	Relevant and Appropriate to the slurry wall containment system; applicable to the soil staging and fixation area.	Section 2510(b) authorizes discretionary use of engineering alternatives in lieu of construction or prescriptive standards where the construction or prescriptive standard is not feasible, there is a specific engineering alternative that is consistent with the performance goal addressed by the other standards and the engineering standard affords equivalent protection against water quality impairment to comply with Chapter 15 requirements.	The soil staging and fixation area and the slurry wall construction zone comply with this action specific requirement and thereby comply with Chapter 15.
Porter-Cologne Water Quality Act °°1058 and 13172; 23 CCR °2520(a)	23 CCR °2520(b)(2)(C); °2520(c)	Relevant and Appropriate	Wastes which if mixed or commingled with other wastes produce violent reaction, heat or pressure fire or explosion, toxic byproducts or reaction products which impair the integrity of containment structures shall only be discharged at dedicated waste management units that are designed and constructed to contain such wastes. Dischargers are responsible for accurate characterization of wastes (e.g., determining whether they are hazardous wastes), including compatibility with containment features/other wastes.	Action specific ARAR that addresses requirements relating to materials compatibility in connection with the construction of the slurry wall.
Porter-Cologne Water Quality Act °°1058, 13172 and 13360	23 CCR °2530(d)	Relevant and Appropriate	Containment structures at waste management units must have foundation/base capable of providing support for structure and withstanding hydraulic pressure gradients to prevent failure.	Action specific ARAR which addresses construction requirements for slurry wall.

Table 8-4 (Continued)
FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
Porter-Cologne Water Quality Act °° 1058, 13172 and 13360	23 CCR °2531(b)(2), (c) and (d)	Relevant and Appropriate	Sets prescriptive standards for Class I (hazardous waste) waste management units. Addresses the use of barriers to prevent lateral movement of fluid (waste and leachate), and design, construction, operation and maintenance or waste management units with respect to 100 year floodplains and geologic faults.	Action specific ARAR relating to the design and construction of the slurry wall at the site.
Porter-Cologne Water Quality Act °° 1058, 13172 and 13360	23 CCR °2540(a), (e) and (f)	Relevant and Appropriate	Prescribes general design and construction criteria for Class I waste management units to prevent migration of wastes to adjacent geologic materials, ground water or surface water and requires maintenance of integrity of containment structures.	Action specific ARAR relating to design and construction of the slurry wall containment system.
Porter-Cologne Water Quality Act °° 1058, 13172 and 13360	23 CCR °2541(a)	Relevant and Appropriate	Requires that materials used in containment structures have appropriate chemical and physical properties to ensure that the structures do not fail to contain waste due to pressure gradients, physical contact with waste, chemical reactions with soil or rock, climatic conditions, etc.	Action specific ARAR relating to the materials to be used in constructing the slurry wall.
Porter-Cologne Water Quality Act °°1058, 13172 and 13360	23 CCR °2541(e) and Table 4.1	Relevant and Appropriate	Prescribes technical requirements for earthen materials to be used in containment structures and construction standards for waste management units other than land treatment.	Action specific ARAR relating to design and construction of the slurry wall containment system.

Table 8-4 (Continued)
FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
Porter-Cologne Water Quality Act °° 1058, 13172 and 13360	23 CCR °2545(a),(b)(1)-(3) and (b)(5)	Relevant and Appropriate	Prescribes requirements for subsurface barriers (cutoff walls) used in conjunction with natural geologic materials so that they meet lateral permeability standards.	Action specific ARAR relating to design and construction of the slurry wall, provided that the keyed depth of the cutoff walls may be reduced to three feet with EPA approval in order to protect the integrity of the Older Clastic Assemblage.
Porter-Cologne Water Quality Act °° 1058, 13172 and 13360	23 CCR °2546	Relevant and Appropriate	Prescribes requirements for precipitation and drainage controls for waste management units and containment structures.	Action specific ARAR relating to the design and construction of the slurry wall containment system, including the drainage controls to be built around the exterior of the slurry wall.
Porter-Cologne Water Quality Act °° 1058, 13172 and 13360	23 CCR °2547	Relevant and Appropriate	Requires that Class I waste management units be designed to withstand the maximum credible earthquake without damage to the foundation or the structures controlling leachate, surface drainage, erosion, etc.	Action specific ARAR relating to the design and construction of the slurry wall containment system, including the drainage controls to be built around the exterior of the slurry wall.

Table 8-4 (Continued)
FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
Porter-Cologne Water Quality Act °° 1058, 13172	23 CCR °2580(a)	Relevant and Appropriate	Requires classified waste management units to be closed according to a closure plan providing for continued compliance with applicable standards for waste containment, precipitation and drainage controls, as well as continued monitoring. Post closure maintenance period shall extend as long as wastes pose a threat to water quality.	Action specific ARAR for entire area within slurry wall containment system should closure occur at some future date; provided however, that any requirement that is not consistent with the surface soils remedy or the institutional controls to be selected as part of the ROD amendment will not be considered AGARS.
Porter-Cologne Water Quality Act °° 1058, 13172,13260 and 13267	23 CCR °2595	Relevant and Appropriate	Requires analysis of how the ground and surface water may affect the waste management unit and how the unit may affect ground and surface water in order to determine the suitability of the unit with respect to ground water protection and avoidance of geologic hazards.	Action specific ARAR for the design of the slurry wall containment system.

Table 8-4 (Continued)
FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
Porter-Cologne Water Quality Act °° 1058, 13172,13260 and 13267	23 CCR °2597(a)(3),(5),(9),(10),(b)(1),(2)	Relevant and Appropriate	Sets forth requirements for closure and post closure maintenance, including topographic map of facility to be closed, precipitation and drainage controls, final cover and post closure land use. Requires map with all proposed structures to be installed over final landfill cover if the waste management unit is to be used for purposes other than non-irrigated open space during the post closure maintenance period along with analysis of water entering, leaving and remaining on-site to ensure integrity of final cover and monitoring system to detect penetration of final cover.	Action specific ARAR for entire area within slurry wall containment system should closure occur at some future date, provided however, that any requirement that is not consistent with the surface soils remedy or the institutional controls to be selected as part of the ROD amendment will not be considered AGARS. The reporting requirements are procedural and therefore not ARAR.
Federal Resource, Conservation and Recovery Act Subtitle C, 42 U.S.C. °6921 et seq.	40 CFR °264.552 as implemented through 22 CCR °66264.552	Applicable	Sets forth requirements for designating and managing corrective action management units (CAMUs) for the management of media containing hazardous wastes otherwise subject to the RCRA Land Disposal Restrictions (LDRs).	Action specific ARAR for the slurry wall construction zone; the soil staging and fixation area, and the RCRA-equivalent disposal cell.

Table 84 (Continued)
FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
Federal Resource Conservation and Recovery Act Subtitle C, 42 U.S.C. section 6921 et seq.	40 CFR 261.20-261.24 and 261.30-261.33, as implemented through 22 CCR 66261.20 - 66261.24, and 66261.30 - 662261.33	Applicable	Specifies the solid wastes which are subject to regulation as listed hazardous waste and the solid wastes subject to regulation as hazardous waste based on hazardous characteristics.	Establishes the RCRA hazardous waste listing for wood processing wastes (F032, F034 and F035) and for wastes which exhibit toxicity characteristics for arsenic, chromium and pentachlorophenol (D004, D007 andD037), Contaminated soils and groundwater which exhibit a hazardous characteristic or contain listed hazardous wastes must be managed as hazardous waste.
Federal Resource Conservation and Recovery Act Subtitle C, 42 U.S.C. section 6921 et seq.	40 CFR 268.40 and 22 CCR 66268.40	Applicable	Specifies the treatment standards for wastes restricted from land disposal.	Action specific ARAR for the management of soils and groundwater which exhibit a hazardous characteristic (D004, D007 and D037) or contain F032, F034 or F035 listed hazardous waste. The RCRA land disposal restrictions will apply to such contaminated media, except for contaminated media placed in a designated area of contamination (AOC) or CAMU.

Table 8-4 (Continued)
FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
Federal Water Pollution Control Act, °402; Porter-Cologne Water Quality Control Act, Cal. Water Code °° 13000, 13140 and 13240; Water Quality Control Plan for the North Coast Region (Basin Plan)	State Water Pollution Control Board (SWPCB) Resolution 68-16, Statement of Policy With Respect to Maintaining High Quality Waters in California	Applicable	Section 402 of the federal Water Pollution Control Act, which sets up the National Pollutant Discharge Elimination System program (NPDES), regulates point source discharges into "waters of the United States." The RWQCBs are the delegated authorities in California to implement the NPDES program. As applied to surface waters, Resolution 68-16, adopted by the NCRWQCB, implements the "anti-degradation" requirement of the federal Water Pollution Control Act. Resolution 68-16 requires that existing high ground and surface water quality be maintained; it requires that activities which produce waste and discharge to existing high quality waters meet waste discharge requirements that (1) result in the best practicable treatment or control of the discharge necessary to ensure that a pollution or nuisance will not occur and (b) the highest water quality consistent with the maximum benefit to the people of the State will be maintained.	This is an action and chemical specific ARAR with respect to the discharge of treated ground and surface/storm water to Beaughton Creek, a tributary to the Shasta River, a water of the United States. The substantive portions of WDR 93-88 and Cease and Desist Order 93-87, adopted by the NCRWQCB, implement Section 402 of the federal Water Pollution Control Act (the NPDES Program) and Resolution 68-16 by setting the best practicable treatment of surface and ground water as set forth below and allowing discharges to Beaughton Creek on a limited basis: Arsenic: less than 5 ug/l Chromium: less than 5 ug/l Copper: less than 5 ug/l Zinc: less than 10 ug/l PCP: less than .3 ug/l TCP: less than .4 ug/l Total PAHs: less than 1 ug/l Dioxins: less than .000025 ug/l EPA implements the substantive requirements of the WDRs as AGARS at CERCLA sites.

Table 8-4 (Continued)
FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
Federal Water Pollution Control Act º303; Porter-Cologne Water Quality Control Act, Cal. Water Code 13050(f); Porter-Cologne Water Quality Control Act, Cal. Water Code ºº 13000, 13140 and 13240	Water Quality Control Plan for the North Coast Region (Basin Plan), Table 2-1 (Beneficial Uses in the North Coast Region); SWRCB Resolution 88-63, Sources of Drinking Water Policy	Applicable	Table 2-1 sets forth the beneficial uses of the waters of the state that may be protected against water quality degradation. Resolution 88-63 specifies that, with certain exceptions, all surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply. Applies in determining beneficial uses for waters that may be affected by discharges of waste.	Location specific ARAR that identifies beneficial uses of Shasta River and its tributaries as including municipal, domestic, agricultural and industrial supply, groundwater recharge, freshwater replenishment, water contact and non-contact recreation, warm and cold freshwater habitat, wildlife habitat, fish migration and spawning. In addition, Resolution 88-63 applies because the designated beneficial use of Beaughton Creek includes municipal and domestic water supply. These uses form the basis for the treatment standards for the effluent being discharged into Shasta River and its tributary, Beaughton Creek.
Federal Water Pollution Control Act º303; Porter-Cologne Water Quality Control Act, Cal. Water Code º13241	Water Quality Control Plan for the North Coast Region (Basin Plan), Chapter 3 (Water Quality Objectives)	Applicable	Water Quality Objectives form the basis for the establishment of waste discharge requirements and discharge prohibitions necessary to protect the present, probable and future beneficial uses enumerated in Table 2-1 (above) and to protect existing high quality waters of the State.	Location specific ARAR that identifies water quality objectives for the Shasta River and its tributary, Beaughton Creek. Objectives used as a basis for adoption of substantive requirements of Orders 93-87 and 93-88 pertaining to discharges to Beaughton Creek.

Table 8-4 (Continued)
FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
Federal Water Pollution Control Act °402; 40 C.F.R. Parts 122, 123 and 124	SWPCB Order No. 92-08-DWQ, NPDES General Permit No. CAS000002 (Waste Discharge Requirements for Discharges of Stormwater Associated With Construction Activity)	Applicable; relevant and appropriate to construction activities affecting less than five acres	Section 402(p) of the Federal Water Pollution Control Act establishes a framework for regulating industrial stormwater discharges under the NPDES program. In November 1990, EPA published the final regulations establishing storm water permit requirements. Discharges of stormwater associated with construction activity from soil disturbance of more than five acres must be regulated as industrial activity and covered by an NPDES permit. The RWQCBs are the delegated authorities in California to implement the NPDES program.	The substantive portions of the general permit are action specific AGARS for all construction activities at the site, including construction of the disposal cell and construction activities associated with the installation of the slurry wall and the gravel drainage trench.
Federal Water Pollution Control Act °402; 40 C.F.R. Parts 122, 123 and 124	SWPCB Order No. 97-03-DWQ, NPDES General Permit No. CAS000001 (Waste Discharge Requirements for Discharges of Stormwater Associated With Industrial Activities Excluding Construction Activities)	Applicable	Section 402(p) of the Federal Water Pollution Control Act establishes a framework for regulating industrial stormwater discharges under the NPDES program. In November 1990, EPA published the final regulations establishing NPDES storm water permit requirements for discharges of stormwater associated with industrial activity. The RWQCBs are the delegated authorities in California to implement the NPDES program.	The substantive portions of the general permit are action specific AGARS for industrial activities relate to the remedy such as equipment operation, and for stormwater runoff flowing over contaminated surface soil at the site.

Table 8-4 (Continued)
FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR J.H. BAXTER ROD AMENDMENT

Source	Standard, Requirement, Criteria or Limitation	Applicable or Relevant and Appropriate	Description of Standard, Requirement, Criteria or Limitation	Manner in Which ARAR Applies; Action, Location or Chemical Specific ARAR
	U.S. EPA Office of Solid Waste, "RCRA Ground Water Monitoring: Draft Technical Guidance," Nov. 1992 (EPA/530-R-93-001)	Not an ARAR, but adopted by EPA as enforceable performance standard.	Sets forth requirements for the development and implementation of a ground water monitoring program.	Applies to the development of a comprehensive monitoring program for the site.

Table 8-5
Comparative Costs of Alternatives ($1,000)

	ALTERNATIVE 1	ALTERNATIVE 2A 3	ALTERNATIVE 2B 3	ALTERNATIVE 3
Slurry Wall/Ground Water Remediation System Cost 1	$11,000	$11,000	$11,000	$11,000
Total Incremental Cost Above No Further Action Baseline 2	0	$26,000	160,000	1,300
TOTAL (4)	$11,000	$37,000	$171,000	$12,300

1. Total Project Cost from RDR. This cost also includes some supporting components of the remedial action that are implemented outside the Target Area.
2. From FFS Appendix E:
3. Alternative 2A costs are for the minimum volume of soil removal; Alternative 2B costs are for the maximum volume of soil removal.
4. These costs represent the total costs for each alternative. The surface soils remedy is not included in these costs.

Table 8-6

Nine Criteria Analysis for the Soil Cover Modification for Surface Soils Containing Inorganic Concentrations Above Background and Below the 1990 ROD Subsurface Soil Excavation Standard

Criterion	Discussion
Overall Protection of Human Health and the Environment	An asphaltic concrete cover will prevent contact of surface water with contaminated soils. Asphaltic concrete will also enhance surface runoff of contaminated soil areas, minimizing or eliminating infiltration and potential leaching of inorganic contaminants from surface soils into underlying soils and shallow groundwater. The asphaltic concrete cover will prevent direct dermal contact with surface soils containing contaminants of concern, and eliminate the potential for accidental ingestion/inhalation. Combined with institutional controls to protect the integrity of the cover and to prevent human exposure to waste left in place, this proposed modification will be sufficiently protective of human health and the environment to meet the remedial action objectives for the site.
Compliance with AGARS	This modification complies with AGARS.
Short-term Effectiveness Protection of community Protection of workers Environmental impacts	Little or no handling of the contaminated soils will be required. Some grading may be necessary to provide an appropriate surface for the asphaltic concrete surfacing. Use of asphaltic paving will entail use of standard construction practices for the placement of paving over impacted soils. Short-term effectiveness will therefore be improved with this modification of the remedial action for surface soils contaminated with inorganics.
Long-term Effectiveness and Permanence Magnitude of residual risk Adequacy of controls Reliability	No reduction in permanence will occur with this change in remedial action. With routine maintenance and appropriate institutional controls, the level of effectiveness and permanence will be sufficiently protective of human health and the environment to meet the remedial action objectives of the site.
Reduction of Mobility, Toxicity, or Volume	Reduction of mobility of all inorganic contaminants will be achieved for all those soils which will be covered with asphaltic concrete paving. The reduction will be achieved by preventing wind erosion, and minimizing or eliminating surface water runoff from contacting the contaminated soils, reducing infiltration.
Implement ability Technical feasibility Administrative feasibility Availability of services	This alternative is readily implementable. There are no technical or administrative factors which would preclude implementation of the proposed remedial actions.
Cost	Elimination of the excavation step and the placement of two feet of covering soil may offset the cost of the asphaltic pavement. However, the difference in the cost of these two options is expected to be relatively low.
State Acceptance	This modification is acceptable to the State.
Community Acceptance	This modification is acceptable to the community.

Table 8-7
Nine Criteria Analysis for Modification of Procedure to Verify Attainment of Soils Treatment Standard for Soils Placed in RCRA-Equivalent Disposal Cell

Criterion	Discussion
Overall Protection of Human Health and the Environment	Although this test procedure is less conservative that the test using a citric acid buffer, because it realistically represents the conditions at the site, the change in test procedure will still provide appropriate overall protection of human health and the environment.
Compliance with AGARS	This modification complies with AGARS. It is not required to comply with RCRA Land Disposal Restrictions (LDRs) because the treated soils will be placed in a Corrective Action Management Unit (CAMU).
Short-term Effectiveness Protection of community Protection of workers Environmental impacts	Although the excavation standard and the leachate procedure used to measure compliance have not been changed, the extent of the soil treatment may be reduced somewhat, reducing the amount of soil handling required during implementation of the remedy. Short-term effectiveness may therefore be improved with this modification of the remedial action for surface soils contaminated with inorganics.
Long-term Effectiveness and Permanence Magnitude of residual risk Adequacy of controls Reliability	Although this test procedure is less conservative that the test using a citric acid buffer, because it realistically represents the conditions at the site, there will be no change in the long-term protectiveness and permanence as a result of this change in test procedure.
Reduction of Mobility, Toxicity, or Volume	Because this test procedure realistically represents the conditions at the site, this change in the testing procedure will not result in any change in the reduction of mobility, toxicity or volume of hazardous materials at the site.
Implement ability Technical feasibility Administrative feasibility Availability of services	This alternative is readily implementable. There are no technical or administrative factors which would preclude implementation of the proposed remedial actions.
Cost	Changing the treatment standard evaluation to use deionized water instead of a citric acid buffer should reduce the extent of treatment required prior to placement in lined cells. The reduction in the overall cost will be proportional to the reduction in the treatment required to meet the standard. The estimated cost savings is approximately $ 210,000. (TRC, 1998)
State Acceptance	This modification is acceptable to the State.
Community Acceptance	This modification is acceptable to the community.

Table 8-8
Nine Criteria Analysis for Modification of Biotreatment Implementation

Criterion	Discussion
Overall Protection of Human Health and the Environment	If properly controlled and monitored, bioremediation in situ using natural microbial populations may achieve the same results as bioremediation in landfarming cells, and potential leaching of organic contaminants from surface soils into underlying soils and shallow groundwater can be adequately controlled. Overall protection of human health and the environment would be essentially the same as that obtained using lined remediation cells; e.g., for soils placed outside lined cells, the organic materials would not be expected to leach into the groundwater at the levels present after treatment. Because no liner is present, there may be some short-term risk to the environment. The extent of this potential risk is limited because the final disposition of the soils being bioremediated is the RCRA-equivalent cell.
Compliance with AGARS	This modification complies with AGARS.
Short-term Effectiveness Protection of community Protection of workers Environmental impacts	In situ bioremediation would reduce the amount of handling of contaminated soils required, reducing the short-term exposure risks. Short-term effectiveness would therefore be improved with this modification of the remedial action for surface soils contaminated with organics. However, the extent to which the remediated soil is moved, and the condition of that soil may increase the short-term risk for materials handling.
Long-term Effectiveness and Permanence Magnitude of residual risk Adequacy of controls Reliability	In situ bioremediation is expected to achieve the same level of treatment as that obtained by remediation in lined landfarm cells. There may be some potential reduction in permanence due to the absence of a liner beneath treated soils. The extent of this reduction in permanence would be dependent in part on the extent of remediation obtained. The final disposition of the soils being bioremediated is the RCRA-equivalent cell.
Reduction of Mobility, Toxicity, or Volume	The same reduction of toxicity and volume of organic contaminants is expected to be achieved for in situ bioremediation as would be achieved for bioremediation in lined landfarm cells. The reduction of mobility is expected to be the same, base on results to date, but could be somewhat lower, depending on the ability to control the bioremediation process.
Implement ability Technical feasibility Administrative feasibility Availability of services	This alternative is implementable, and would require methods nearly identical to bioremediation in lined cells. The success of the treatment technology will depend on the ability to adequately introduce the microbial populations into the in situ soils with sufficient nutrients and fertilizers to provide effective remediation while generating minimal or no leachate. There are no administrative factors which would preclude implementation of this proposed remedial action.
Cost	Elimination of the initial excavation step and the construction of lined landfarm cells that would otherwise have been used during bioremediation will reduce the cost of implementing this remedial action.
State Acceptance	This modification is acceptable to the State.
Community Acceptance	This modification is acceptable to the community.

Table 8-9
Nine Criteria Analysis for Alternative Treatment and Disposal Options for Area B Soils

Criterion	Discussion
Overall Protection of Human Health and the Environment	If the technology is successful, it will meet remedial action goals for soils and will be protective of groundwater. Surface soil protection is the same as described in the September 25, 1990 ROD (1 X 10 -6 level for carcinogenic PAHS).
Compliance with AGARS	This alternative will comply with AGARS.
Short-term Effectiveness Protection of community Protection of workers Environmental impacts	Risk for workers lower than previous options in the September 25, 1990 ROD because little or no excavation of soils is required if in situ treatment alternative is effective. Level of toxicity of the soils from organics would be significantly reduced if the treatment standards can be achieved for most of the soils remediated.
Long-term Effectiveness and Permanence Magnitude of residual risk Adequacy of controls Reliability	Some potential reduction in permanence with the elimination of the lined cells for most of the treated soils. However, the level of effectiveness and permanence will be the same as for all soils left in place, since the Area B cleanup standards are as protective as those used to evaluate the need for excavation and treatment of other soils contaminated with organics at the site.
Reduction of Mobility, Toxicity, or Volume	Reduction of mobility, toxicity, and volume of organic contaminants will occur through in situ treatment. If the Area B soils can not be treated in situ to levels that are protective of groundwater, reduction of mobility, toxicity, and volume will occur by excavation and disposal in the RCRA-equivalent cell.
Implement ability Technical feasibility Administrative feasibility Availability of services	Treatability studies are required to determine the effectiveness of the bioventing alternative. There are no administrative factors which would preclude implementation of the proposed remedial actions.
Cost	Elimination of excavation and the lined treatment cells will significantly reduce treatment and materials handling costs. The ability to leave soils in place will eliminate the cost of excavation and disposal in a RCRA-equivalent cell.
State Acceptance	This modification is acceptable to the State.
Community Acceptance	This modification is acceptable to the community.

Table 8-10
Seven Criteria Analysis for Designation of the RCRA-equivalent Disposal Cell, the Slurry Wall Construction Zone, and the Soil Staging and Fixation Area as RCRA Corrective Action Management Units (CAMUs)

Criterion	Evaluation
(1) The CAMU must facilitate the implementation of reliable, effective, protective, and cost effective corrective action measures.	Designation of the of the RCRA-equivalent disposal cell as a CAMU will facilitate the on-site treatment and disposal of contaminated soils while ensuring that the remedy remains protective. The CAMU designation will enable the use of Site-specific tests to measure compliance with treatment standards and will thereby enhance the cost-effectiveness of the remedy by reducing the volume of soils requiring treatment while maintaining an equivalent level of protection. The RCRA-equivalent disposal cell will comply with the RCRA and Chapter 15 design, construction, operation, closure and postclosure requirements for landfills identified in Table 8-11, and will thereby effectively and reliably contain contaminated soils. Designation of the soil staging and fixation area as a CAMU will facilitate the implementation of the slurry wall construction and will facilitate the excavation and treatment of contaminated soil by providing a temporary place to safely stockpile soils. This CAMU will remain protective of human health and the environment because is has required features (see Table 8-12) that will contain wastes reliably, effectively and temporarily (one year). The stockpiled soils will be treated prior to disposal in a RCRA - equivalent disposal cell. Being that is a temporary structure, the soils staging and fixation area will be more cost effective than building a permanent facility that would require more complex structure. It will ultimately be protective because upon completion of said treatment activities (one year) all contaminated equipment, structures and soils in the soil staging and fixation area will be excavated and disposed of, or decontaminated, followed by construction of an asphalt cap. Designation of the slurry wall construction zone as a CAMU will facilitate the construction of the slurry wall. Thorough mixing of the slurry compound and soil before placement is required to insure the protectiveness, reliability, and efficacy of the wall. The integrity of the wall is dependent on this process, and the handling of these large volumes of soil must take place above ground to be cost-effective or even feasible. Placement of the slurry mixture in the trench is necessary to form the structure of the slurry wall, which will create an underground barrier to contain DNAPLs and contaminated groundwater in the shallow aquifer.

Table 8-10 (continued)
Seven Criteria Analysis for Designation of the RCRA-equivalent Disposal Cell, the Slurry Wall Construction Zone, and the Soil Staging and Fixation Area as RCRA Corrective Action Management Unit s (CAMUs)

Criterion	Evaluation
(2) Waste Management activities associated with the CAMU shall not create unacceptable risks to humans or the environment.	The RCRA equivalent disposal cell will be operated and maintained in accordance with the RCRA and Chapter 15 requirements set forth in Table 8-11 and will therefore be protective of human health and the environment. The soil staging and fixation area will be operated and maintained in accordance with RCRA and Chapter 15 requirements set forth in Table 8-12 to prevent leachate generation, wind dispersal and general surface contact. Therefore it will not create an unacceptable risk to humans or the environment. The slurry wall construction zone will be handling soils that are mostly uncontaminated. The small volume of soil that might contain some low levels of contaminants will be exposed in the TI zone for a very short period of time due to the short slurry wall construction process. Waste management activities associated with the slurry wall construction process will therefore be protective of human health and the environment.
(3) The CAMU shall incorporate uncontaminated areas only if the inclusion of such areas allows better protection.	The RCRA-equivalent disposal cell will be located in an uncontaminated area of the Site. Creation of a single disposal cell in an isolated area of the Site will reduce the possibility of damage to the cell from ongoing plant operations and will simplify long-term maintenance of the cell cover. In addition, this location will reduce worker exposure to contaminated soils during the construction of the cell "bottom" (i.e. the soil berms, vadose zone monitoring system and bottom liners). The soil staging and fixation area is underlain by both contaminated and uncontaminated soils. Incorporating uncontaminated areas of the Site will facilitate the location of the soil staging and fixation area where it will not be disturbed by ongoing plant operations. In addition this location will facilitate placement of soils into the RCRA cell because it is in proximity to both the areas where soils will be excavated and the RCRA-equivalent disposal cell. Closure of the soil staging and fixation area includes excavation of all contaminated soils, followed by construction of a protective asphalt covering. Most of the slurry wall construction zone will be within the TI zone and therefore not in an uncontaminated area. Locating part of the construction zone in an uncontaminated area is necessary to insure proper mixing of the slurry compound and soil to guarantee proper construction of the wall, which will in turn allow better protection.

Table 8-10 (continued)
Seven Criteria Analysis for Designation of the RCRA-equivalent Disposal Cell, the Slurry Wall Construction Zone, and the Soil Staging and Fixation Area as RCRA Corrective Action Management Unit s (CAMUs)

Criterion	Evaluation
(4) Areas within the CAMU, where wastes remain in place after closure of the CAMU, shall be managed and contained so as to minimize the potential for future releases.	The RCRA-equivalent disposal cell will be closed and maintained in accordance with the RCRA landfill closure and post-closure requirements set forth in Table 8-11. The RCRA-equivalent cell will be capped to prevent future releases. Long-term maintenance of the cap and the RCRA-equivalent cell containment features as well as groundwater monitoring will ensure that the RCRA-equivalent cell does not release contaminants to soils and groundwater. No wastes will remain in place at the soil staging and fixation area or in the above-ground slurry wall platform. Any contaminated soil incorporated into the structure of the slurry wall will be contained and immobilized by the matrix of the slurry wall, minimizing the potential for future release.
(5) The CAMU shall expedite the implementation of corrective action measures.	The RCRA-equivalent disposal cell will expedite the implementation of the remedy because on-site disposal of contaminated soils will be both faster and more protective than off-site treatment and disposal. On-site disposal will require soils to be transported only once and will thereby reduce worker exposure during handling as well as off-site residents' exposure to contaminated wind-blown dust. The CAMU designation will also expedite the implementation of the remedy by reducing the amount of soil requiring treatment while maintaining an effective level of protection. The construction at this site is to take place during two major phases. The phases have been established based on the limited window of time available for construction, because the site is still an operating facility. The soil staging and fixation area will hold contaminated soils excavated during the first phase of construction that await disposal once the RCRA-equivalent disposal cell is constructed in the second phase. Fixation of soils that do not meet the modified leachate test will take place here, expediting the disposal of soils once the RCRA-equivalent disposal cell in constructed. Without the slurry wall construction zone, construction of the slurry wall would not be possible. The CAMU will expedite the implementation of the corrective action measures by permitting the implementation of the only feasible method to construct the slurry wall.

Table 8-10 (continued)
Seven Criteria Analysis for Designation of the RCRA-equivalent Disposal Cell, the Slurry Wall Construction Zone, and the Soil Staging and Fixation Area as RCRA Corrective Action Management Unit s (CAMUs)

Criterion	Evaluation
(6) The CAMU shall enable the use of treatment technologies to enhance long term effectiveness of corrective actions by reducing the toxicity, mobility or volume of wastes.	The use of the selected remedial actions of bioremediation and stabilization will reduce the volume, toxicity and mobility of the wastes to be stored in the RCRA-equivalent disposal cell CAMU at the Baxer site. The soil staging and fixation are CAMU, a temporary feature, will facilitate the stabilization activity that will reduce the and mobility of the wastes in the RCRA-equivalent disposal cell. The slurry wall will reduce the mobility of wastes in the groundwater within the slurry wall, and will enhance the remediation of groundwater outside the DNAPL zone. Extraction and treatment will reduce the toxicity and volume of the wastes in the groundwater outside the DNAPL zone.
(7) To the extent practicable, the CAMU shall minimize the land areas where wastes will remain in place after closure of the CAMU.	The RCRA-equivalent disposal cell will enable excavated soils from various parts of the Site to be contained in one location, thereby reducing the land areas where wastes will remain in place after closure. In addition, in situ bioventing of organics-contaminated soils in Area B, if successful, will significantly reduce the amount of contaminated soils left in place at the Site upon closure of the RCRA-equivalent cell. No wastes will remain in place at the soil staging and fixation area. No wastes will remain in the above ground slurry wall working platform. A small portion of the slurry wall will contain contaminated soil fixed in the matrix of the wall.

Table 8-11
Design, Operation, Closure, and Post-closure Requirements for RCRA 8 -equivalent Disposal Cell

Citation	Requirement
40 CFR b º264.18 as implemented through 22 CCR c º66264.18; 23 CCR 2531 (c)-(f).	Requires that new facilities not be located within 61 meters (200 feet) of a fault which has been displaced in Holocene time. In addition, a landfill may not be located in a floodplain subject to a 100-year return period or in areas subject to rapid geologic change or tidal waves.
40 CFR º261.301(a)(1)(i) & (iii) and º264.301(c) as implemented through 22 CCR º66264.301(a)(1)(A) & (C) and º66264.301(c); 23 CCR º2542.	Design standards for the liner system, the leachate collection and removal systems, and leak detection systems.
40 CFR º264.301(a)(1)(ii) as implemented through 22 CCR º66264.301(a)(1)(B).	Requires foundation or base capable of providing adequate support to prevent liner failure.
40 CFR º264.301(j) as implemented through 22 CCR º66264.301(i); 23 CCR º2544(a) and (b).	Interim and final cover to control wind dispersal of particulate matter. Interim cover to minimize percolation of precipitation through wastes.
40 CFR º264.303(a) as implemented through 22 CCR º66264.303(a).	During and immediately after construction or installation, liners must be inspected to ensure that they meet the standards.
40 CFR º264.14 as implemented through 22 CCR º66264.14	Security requirements during construction and operation.
40 CFR º264.314 as implemented through 22 CCR º66264.314; 22 CCR º66264.318.	Requirements for management of liquid and nonliquid waste.
40 CFR º264.15 and º264.303(b) as implemented through 22 CCR º66264.15 and º66264.303(b).	Requirements for inspection during operation of landfill.
40 CFR º264.310(a) as implemented through 22 CCR º66264.310(a)	Requirements for the design and construction of the landfill cover.

Table 8-11
Design, Operation, Closure, and Post-closure
Requirements for RCRA a -equivalent Disposal Cell

Citation	Requirement
40 CFR º264.25 as implemented through 22 CCR º66264.25.	Landfill and cover must be designed to withstand maximum credible earthquake and 24-hour probable maximum precipitation.
40 CFR º264.117 and º264.310(b)-(d) as implemented through 22 CCR º662464.117 and 22 CCR º66264.310(b)-(d).	Requirements for closure and post-closure care and maintenance of the landfill.
40 CFR º264.112 and º264.118 as implemented through 22 CCR º66264.112 and 22 CCR º66264.118.	Requires written closure and post-closure plan.
40 CFR º264.91(a), º264.97, and º264.98 as implemented through 22 CCR º66264.91(a), º66264.94, º66264.97 and º66264.98; 22 CCR º66264.700.	Requirements for detection and evaluation monitoring, including monitoring of soil pore liquids, to ensure that the landfill does not release any contaminants to groundwater. Requirements for monitoring to ensure that the landfill does not release any contaminants to air or soil.

Notes:
a RCRA - Resource Conservation and Recovery Act
b CFR - Code of Federal Regulations
c CCR - California Code of Regulations

Table 8-12
DESIGN, OPERATION, CLOSURE AND POST-CLOSURE
REQUIREMENTS FOR THE SOIL STAGING AND FIXATION AREA CAMU

Citation	Requirement
Title 23 CCR a, Ch. b 15,º2544(c)	Requires an interim cover to minimize percolation through wastes.
Title 23 CCR, Ch. 15, º2546(f)	Requires cover material to be graded to divert precipitation from waste piles.
Title 23 CCR, Ch. 15, º2542(c)	Requires a synthetic liner with a minimum thickness of 40ml.
Title 23 CCR, Ch. 15, º2530(c)	Requires siting, design, construction, and operation of waste piles to be a minimum of 5 feet above highest anticipated elevation of underlying ground water.
Title 23 CCR, Ch. 15, º2540(a)	Requires prevention of waste migrating from the waste piles to adjacent areas, ground water or surface water.
Title 23 CCR Ch. º2531(c)-(f)	Requires that waste management unit not be located within 200 feet (61 meters) of a fault which has been displaced in Holocene times. In addition, the unit must not be located in a floodplain or must be designed, constructed, operated and maintained to prevent washout by a 100-year flood. The unit must not be located in areas subject to rapid geologic change or tidal waves.
Title 23 CCR Ch. º2547	Requires the waste management unit to withstand an earthquake without damage to leachate control, surface drainage, erosion or gas.
Title 23 CCR, Ch. 15 º2542(d)	Requires liner to cover entire area likely to be in contact with wastes.
40 CFR c º264.258(a) as implemented through CCR º66264.258(a)	Requires wastepile to be excavated for closure.

Table 8-12(Continued)
DESIGN, OPERATION, CLOSURE AND POST-CLOSURE
REQUIREMENTS FOR THE SOIL STAGING AND FIXATION AREA CAMU

Citation	Requirement
40 CFR º2646.15(a), as implemented through CCR 66264.15(a)	Requires inspection of waste piles for discharge or release of hazardous waste, and that action will be taken to remedy any deterioration or leakage of the waste piles.
40 CFR º264.14(a) and (c) as implemented through CR 66264.14(a) and (c)	Requires prevention of unauthorized access to the waste piles, and posting of signs alerting unauthorized personnel to keep out.

Notes:
- a CR - California Code of Regulations
- b Ch. - Chapter
- c CFR - Code of Federal Regulations

FIGURES

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